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The **IRON AGE**

Vol. 158, No. 26 December 26, 1946

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ESTABLISHED 1855

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December 26, 1946

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T'was the Day After Christmas

THIS first real postwar Christmas was one for the books. It looks like Pop pried open the kids' bank and Mom yanked the last buck from under the mattress for a buying spree that's practically cracked the welkin. And as the last alcoholic off-key chorus of Auld Lang Syne swells out in a record New Year's Eve celebration, there comes the feeling that boom hysteria is over—a sort of reluctant farewell to five years of unreality.

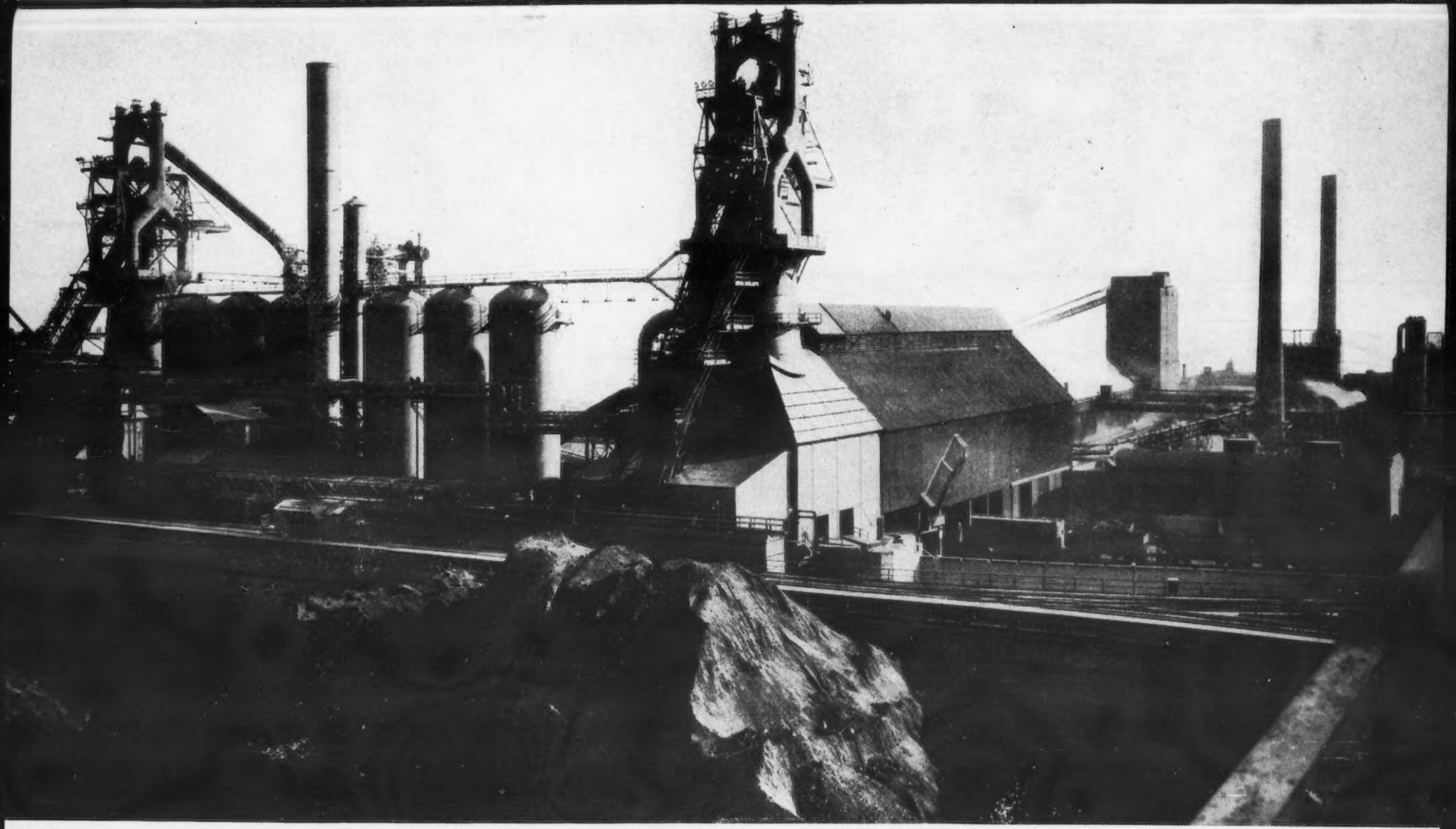
Those early boom days had their bright spots—when common danger welded everyone into common purpose: the good days of hysterical self-sacrifice and hard work, when one man's hand reached out in understanding to another. Those days of neighborhood air raid wardens, of Red Cross first-aid, of blood donors. Those days of courtesy in store and plant; when hotel clerks shook their heads with sympathetic reluctance, and even railroad dining car stewards still said, "Sir." Those days of money in every pocket, when a dollar was still a dollar the next day.

It was the rag end boom days that left an acrid taste in the mouth; with every man hammering out his own selfish ends. The days of subterfuge, the wink, the under-counter merchandise for the favored few, the ever-stretched hand for a bribe, the days of moral compromise, of outrageous mark-ups. The days of bickering, diversity of purpose and of frustration.

So Pop has gone all out for baby's toys, and Mama has bought her frivolous gimcracks. And there on the shelves is the overpriced finery, shoes are being shipped back to the factory, high-priced liquor is going begging, the bribe for a new car is dropping lower and lower, railroads are bragging about employee brush-up courses in courtesy, manufacturers are advertising for salesmen, and Washington hotel clerks are saying "yes" with a Dentine smile.

So as the New Year's celebrant blearily ogles the bottom of his glass, a salty tear slides down while he fleetingly grasps to recapture the boom. The days of reality lie ahead. The dollar will soon measure real value and the customer will soon always be right.

T. W. Lippert



VIEW OF FORMER GOVERNMENT OWNED BLAST FURNACE PLANT BOUGHT BY INLAND
This plant was originally built and operated by Inland for the government to produce additional iron for war purposes. It covers 50 acres adjoining Inland's Indiana Harbor Works, and includes two 1,000 ton blast furnaces, two batteries of coke ovens, and a by-product plant.

The purchasing agreement provides that Inland shall produce merchant pig iron for the veterans' housing program for a period of time. Later on, however, it will form the basis for an increase in Inland's overall steel capacity.

INLAND STEEL COMPANY, CHICAGO, ILLINOIS

Rumors that a Detroit automobile manufacturer had paid $33 a ton for heavy lting steel scrap have been indignantly denied. Scrap dealers pointed out that is would have been practically double the old ceiling prices whereas the scrap rket move last week generally carried quotations to about 50 to 65 pct above e OPA limits. But the latest level, if it holds or climbs, is bound to be flected in higher across the board steel prices.

Magnesium, pure to 0.003 pct, is now available in limited quantities. Spectoaphic analyses of the ultra-pure magnesium have demonstrated the presence, in ry minute quantities, of seven elements that heretofore were not known to ist in magnesium.

De Havilland, the British aircraft firm, has assembled a plane without the e of rivets. Its aluminum sheets are "glued" together, a technique which may tremendously important in the development of supersonic aircraft.

Russia has on order in the United States at least four of the largest gold redges ever built. The Soviets annually produced about $175 million in gold (at urrent prices) before the war, and apparently plan to step up that figure. his may explain Russia's seeming indifference to international agreements for moothing the mechanism of foreign trade.

Research work is nearing completion on the production of steel powders with arbon content to meet buyers' specifications. Production methods have been orked out for control of combined carbon and micro studies show uniformity in arbon distribution. Formal announcement of the carbon steel powders is expected uring the first quarter of 1947.

The newspapers, says the CIO, "are 7 to 2 against the people" in their reponderant opinion against the practicability of the guaranteed annual wage. he union is also concerned over the inequalities caused by "the operation of l separate" unemployment insurance systems in the 48 states.

The South American republic of Ecuador has put in a bid for colonists by pening up "124,000 acres of rich land for British and American colonization." he republic, whose principal exports are crude rubber, balsa wood, quinine, offee and fruits offers settlers 124 to 248 acres tax free for the next 5 yr.

Although the tonnage is not substantial and may not be significant as yet, ome cautious steel buyers, frightened by their large inventories, have been ancelling some steel orders. Part of the cancellation may be a revision in equirements, but there is an indication that some of the cuts show that more autious buying is becoming the policy of some companies.

The fact that molded plastic products need no finishing after they came out f the mold has long been one of their outstanding advantages. However, a trend o the use of enamel and paint finishes is growing in cases where a change in olor appears necessary after the product is made or where a light color presents ifficulties from a molding or economic standpoint.

To increase the life of thread rolling dies made of high speed steel it has een found that they should be given a double draw, and an interrupted quench is ecommended.

Mexicans are reported to be paying as high as $8000 for American motor cars. n estimated 12,000 U. S. cars have been shipped to Mexico during 1946.

Automotive engineers are now talking about motor trucks that will carry eavy payloads over superhighways at 70 mph or better. Within 5 yr, they say, ower plants developing between 300 and 400 hp, using injected super-fuel, and aking full advantage of light chassis materials will make such speeds possible.

Importers and exporters have long recognized the need for the United States o expand imports but a new note is injected into the picture by Secretary of Commerce Harriman's broad thinking which stresses the need of developing imports, expanding travel and encouraging foreign investments. It is vital, he feels, that Americans seek overall world trade increases instead of merely trying for a larger share of a relatively limited volume of trade.

The year 1946 saw tremendously increased sales of aluminum in building construction and a few new developments that look bright for the future. Among the latter are highway truck and trailer bodies, which are also getting a play in magnesium. Aluminum refrigerator cars are being tested and huge sales of field crates for citrus fruit growers were reported for the first time during the year.

A Brazilian company, Laminacao Nacional de Metals, has ordered equipment for coloring aluminum by a method which is a combination and refinement of known processes. Pilot plant experiments were successful and the commercial production of colored aluminum products involving the use of nine to ten baths is expected to be under way within the next 3 months. Blue is the best color for wear and red has been a difficult problem.

FINISHES FOR PLASTICS

The expanding application of enamel and paint finishes to plastic products is discussed herein. Basic considerations (f/o) formulations for such uses and the practical possibilities of such finishes, particularly from the viewpoint of color, are explained.

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By H. W. DELL

Technical Service Dept., Glidden Co., Cleveland

o o o

USE of enamel and paint finishes on plastics presents a number of extremely interesting opportunities to users of plastic items. However, the application of such coatings is not devoid of problems. In this article it is intended to discuss briefly several aspects of this type of finishing operation.

Plastics, like metals, pose finishing problems of considerable chemical complexity, requiring careful study of the characteristics of the individual plastic involved. Basic plastic types for which this company has formulated coatings include the phenolic molded types, the urea and melamine types, the cellulose, the vinyloid, the methacrylate (lucite), the polystyrene, the polyethylene and the polytetrafluorethylene. Work also has been done on the still developing silicones.

The complexity of the problem of plastic finishing and coating can be appreciated from realization that literally hundreds of types of plastics stem from the basic groups listed above. Each individual plastic must be studied for the nature of its chemical composition, its plasticizers and the use for which it is intended.

Thus, to the prime consideration of adhesion to the surface of these often glass-smooth and impervious materials, is added that of the solvent which is to be used in formulating a finish. Will the solvent harm the material in the plastic?

Widest use of coatings for plastics is found in the phenolic molded types, of which bakelite is perhaps the best known. Characteristics of this material include high heat resistance, permitting the application of a baking enamel, and high resistance to chemical action, allowing a greater choice of finishing materials. Bakelite molded articles, especially radio cabinets of the table model type (see fig. 1), usually are given a baking type of enamel for the exterior finish.

Finishers of such articles sometimes roughen the surface of the piece with sandpaper in order to improve the adhesion of the enamel and increase the abrasion, mar and scuff resistance of the finished coating. Some finishers improve these qualities by dipping the articles in a caustic soda solution which also roughens the surface of the plastic. The great majority of such articles, however, are not treated before the enamel is applied.

The enamel finish used on phenolic molded types is shipped in a state of heavy viscosity and must be reduced with coal tar solvents such as xylol, toluol or solvent naphtha for use in the spray gun. Practically all such enamels are applied by spray on a production line and then are baked by various means. Box type ovens, usually gas fired, have been used for the baking operation but recently infrared conveyor ovens have been employed. Baking time and temperature vary according to the type of oven used. In the box type ovens the time and temperature of baking range from 1 hr at 250°F to 0.5 hr at 300°F.

In infrared ovens the time will vary from 4 to 10 min with a peak heat in some ovens of as high as 400°F. Time and temperature in the infrared ovens depend entirely upon the construction of the oven.

The finished pieces have a tough, glossy surface which is marproof, scuff and abrasion resistant and able to withstand washing and spillage of various

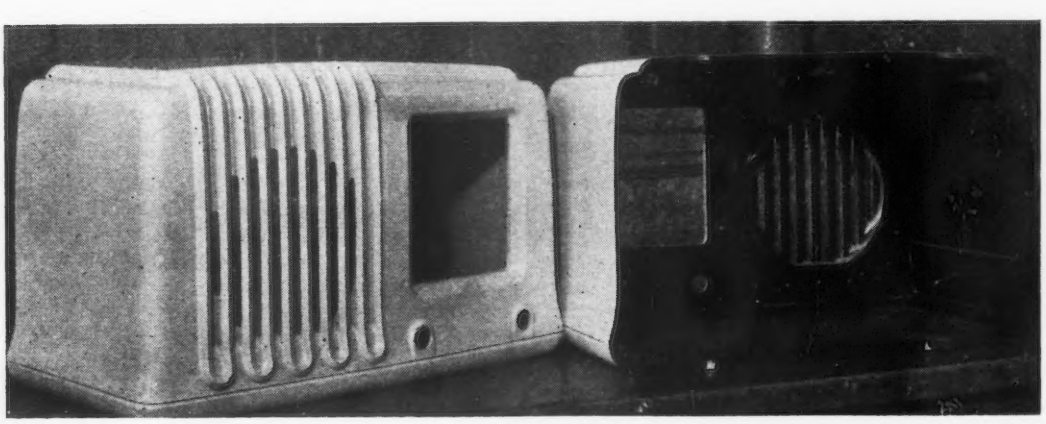

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FIG. 1 — Typical example of application of enamel to a bakelite radio cabinet, showing the dark original color of the plastic and the cream coated exterior.

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liquids in the home. The Glidden Co.'s formulation of this type of enamel involves the use of the so-called glyceryl phthalate types of varnishes, blended with varying amounts of urea, melamine or urea-melamine resin solutions in order to impart hardness, speed of dry and mar resistance after baking. Humidity and chemical resistance also result from this formulation.

Frequently additional marproofing agents are mixed with the enamel. These materials have the property of floating to the surface of the enamel during the baking process, thus forming a minute film which increases the resistance of the finish to scuffing, abrasion and marring. Colors used in finishing these phenolic molded pieces are usually pastel shades of ivory, cream or buff, which are popular because they are likely to blend readily with home furnishings. The pigments usually are titanium dioxides tinted to the desired shade with chrome yellows, yellow iron oxides and red iron oxides.

Titanium dioxides are employed largely because of the high hiding and covering properties of this material which allow the use of a minimum amount of pigment and yet give the desired one coat hiding which is necessary in spraying articles of this type.

Coatings for the methacrylate, polystyrene, polyethylene and polytetrafluorethylene plastics are primarily developed for decorative purposes. An example of this use is the chime case of a polystyrene material shown in fig. 2. The design of the case was pressed on the rear surface and was filled or "rubbed in" with gold and a cream enamel was then applied to the entire rear surface, as shown in fig. 3. Thus, the visible plastic surface was left untouched in its naturally attractive state, but its beauty was heightened by the colors which showed through from the rear. This is an excellent example of the use of finishes to heighten the innate decorative value of many plastics.

In these plastic types, also, the distinction between plastics and the finishes themselves tends to disappear. There is, of course, considerable similarity between molded plastics and synthetic finishes. Both have similar synthetic resin ingredients, with the finishes modified so they can be liquified and applied to a product with a spray gun or brush.

In metal finishing, paints and plastics have many identical applications. In many instances, however, the finishes allow the metal goods manufacturer greater diversity. The material may be coated with the lettering and color desired before the metal is shaped to its finished form. Bottle caps of metal, for example, are enameled and lettered before being put on the bottles and it is necessary to provide a finish flexible enough to stand the extrusion, compression, crimping and knurling required to shape the cap to the bottle mouth. A child's tin beach pail is another product which is coated before it is stamped and formed into shape.

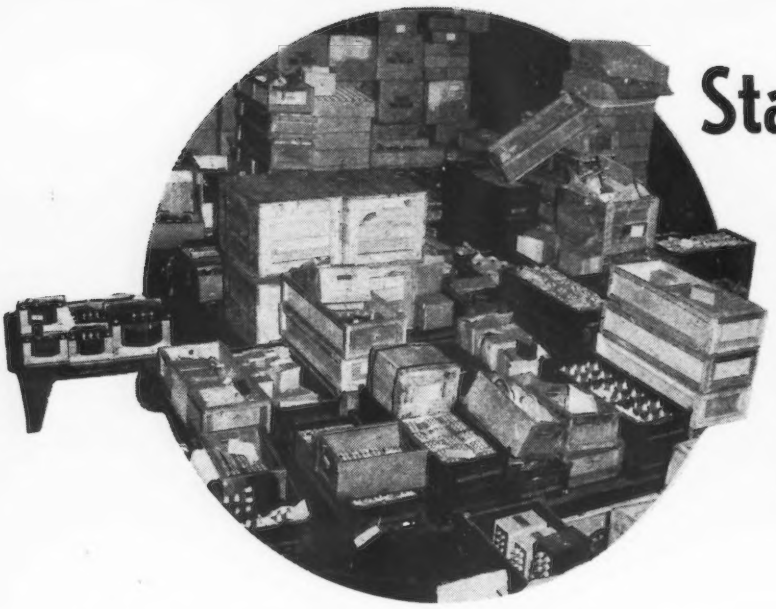
A magnesium griddle is being marketed today which is sprayed with a plastic coating soluble in warm water. Its use is solely to protect the high brilliance of the metal during the merchandising of the product, after which it becomes no longer useful or necessary. Similarly, metal articles sometimes are finished with a plastic which is, essentially, no more than an enamel or paint. Brilliant hues are possible with these materials, adhesion of a very thin coat is a major problem and, in general, plastic and finish are one and the same thing.

FIG. 2—A polystyrene plastic chime box in which the design is stamped on the rear surface and then covered with enamel. The front of the box is uncoated.

Contrary to the early assumption that plastics, because they can be colored in production, would eliminate the need for paint in finishing, experience to date has indicated many new uses for such finishes in the plastic field.

Typical of these experiences is that of a radio manufacturer which had produced a large number of cabinets in red plastic and found that the finished product did not sell and had to take a loss on this lot of radios. However, had these cabinets been coated with a baked enamel, the manufacturer could have watched the sales figures, concentrated on salable hues and kept the loss at a fraction of the total. As an indication of the developing use of coatings on plastic products, coatings have been perfected for furniture of all types, cigarette cases, compacts, chime boxes, nameplates of all kinds, radio cabinets, radio knobs, automobile trimmings, cigarette holders, handles of all types (on coffee and tea pots, for example) and plastic moldings.

FIG. 3—The design shown on the chime box in fig. 2 is sprayed, as shown here, after the pressed-in design has been filled with a gold finish.



Standard Systems—

A vital, but often neglected, phase of successful management is the careful and scientific design and issuance of standard manufacturing procedures. In this article the authors described, step by step, the staffing and functioning of a systems department, and explain in detail the types of publications necessary for successful operation of a systems department.

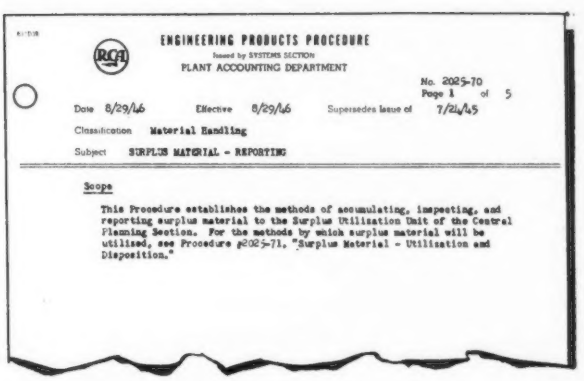
ADEQUATE control procedures avoid the costly uncontrolled handling of material, such as the storage space shown here, and encourage the orderly control illustrated on the opposite page.

COORDINATING the efforts of groups of people in factory or office requires two elements of supervision. First, encouragement or stimulation to work and, second, instructions on what to do and how it is to be done. The first must be provided by the supervisor or executive. The second can be furnished by the careful and scientific preparation and issuance of written procedures.

Many offices or factories continue for years paying little attention to operating systems because it is difficult to see that such systems are costly or inefficient. Considerable attention may be given to the manufacturing processes and methods because these can be easily observed at the workplace. Inefficiencies in the physical work of making the product are more readily seen and corrected. Some companies have as many as four timestudy, process, and methods men for each 100 direct employees simply because the management is conscious of the need for improving workplace efficiency. Operating systems on the other hand may be left to chance or to the individual judgment of those who happen to be involved at the time. This is almost the same as permitting the direct labor supervisor to select his own tools and determine how he will do his job according to his preference.

The control of systems can be effected by the establishment of a group of qualified persons who will be responsible for the design and issuance of standard procedures. In order that this group will operate efficiently, it must be properly placed in the organizational structure of the company. The organizational location of such a group is determined by considering the basic needs of a systems department, as (1) Access to all information; (2) freedom from routine operating responsibilities; (3) independence of action, and (4) authority to enforce adherence to standard procedure.

Consideration of these requirements makes it evident that in order to satisfy them the systems department should be a separate and distinct entity, neither connected with nor subordinate to any other plant function, and responsible only to the highest plant authority. In short, it should be a separate department reporting to the plant manager. It then, by the authority of the plant manager, has free access to all records and information in the plant. It is completely separate from any other plant function and therefore is not required to be a part of the manufacturing cycle. Complete independence from other functions also removes the department from sectional influence and permits decisions based on the requirements of the entire plant and not upon any particular portion of it. Reporting to the plant manager provides authority for enforcement of procedures without going through intermediate steps.



ENGINEERING PRODUCTS PROCEDURE
Issued by SYSTEMS SECTION
PLANT ACCOUNTING DEPARTMENT

No. 2025-70
Page 1 of 5

Date 8/29/46 Effective 8/29/46 Supersedes issue of 7/24/45

Classification Material Handling

Subject SURPLUS MATERIAL - REPORTING

Scope

This Procedure establishes the methods of accumulating, inspecting, and reporting surplus material to the Surplus Utilization Unit of the Central Planning Section. For the methods by which surplus material will be utilized, see Procedure #202-71, "Surplus Material - Utilization and Disposition."

FIG. 1—A typical "Procedure" publication, the official standard operating instruction source.

The three main activities of the systems department are: (1) Systems design and installation; (2) systems follow-up, and (3) publication coordination and control. Systems design and installation is the primary function of the department and consists of determining the proper routine to be followed, writing the procedure, selling the system to the operating personnel and installing the system. Each of these elements is important and cannot be slighted if complete success in the operation of the system is to be attained.

The follow-up function is performed by one or sev-

—Vital Aid to Management

o o o

By T. A. McMULLEN and J. H. QUICK
Supervisor of Systems and Industrial Engineer, respectively, RCA Victor Div., Radio Corp. of America, Camden, N. J.

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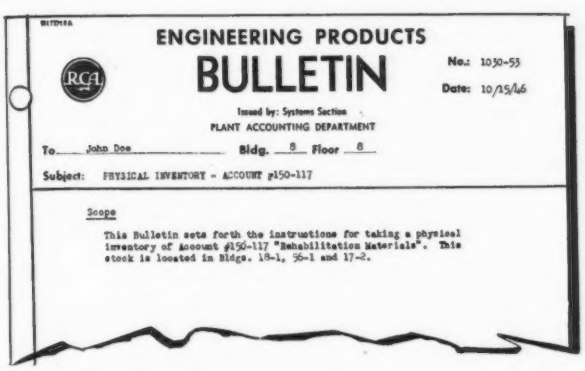


ENGINEERING PRODUCTS
BULLETIN
No.: 1030-53
Date: 10/25/46
Issued by: Systems Section
PLANT ACCOUNTING DEPARTMENT
To: John Doe Bldg. 8 Floor 8
Subject: PHYSICAL INVENTORY - ACCOUNT #150-117
Scope
This Bulletin sets forth the instructions for taking a physical inventory of Account #150-117 "Rehabilitation Materials". This stock is located in Bldgs. 18-1, 56-1 and 17-2.

FIG. 2—This systems department publication, the "Bulletin," is designed for use in emergencies until the more complete and thorough "Procedure" publication can be compiled and issued.

eral men, depending upon plant conditions. It involves investigation of all issued publications in order to determine their degree of effectiveness. Reports are made to the department head and act as a check on the performance of both the systems department and the plant. The importance of this activity cannot be overlooked. Without adequate follow-up, procedures become scraps of paper. Publication coordination and control activities include typing, reproduction, filing, maintenance of manuals, indexing and identification of publications, and control of distribution. The group performing this function is also responsible for the accumulating and cataloging of necessary information, and the maintenance of a technical library.

The systems department will operate best if composed of men drawn from both outside the plant and inside the plant. The outside men will bring a fresh viewpoint and a knowledge of other enterprises. The inside men will supply the needed knowledge of the operations of the plant. Both, however, will need orientation and development. Proper training is essential. Formalized classes covering the operations of the plant, plus specialized refresher courses on such subjects as technical writing, accounting, and tabulating equipment, will pay for themselves many times over. An example of this type of training which has proved highly successful is a short course on the accounting system in use in the plant.

ADEQUATE control systems result in orderly, economical control of material as illustrated here.

The tangible results of the efforts of a systems department are its publications. Regardless of how they may be referred to—procedures, instructions, standard practices—it is through them that the development of systems and policies is made known to the plant. There are so many factors to consider in the issuance and control of procedures that a large amount of planning is necessary before the first one is published. This preliminary ground work is important, for mistakes made in the initial stages are difficult and costly to remedy later on. The major items to be decided upon are the types and format of the publications, the style of writing and presentation of the procedures, the organization of the manuals, the method and control of distribution, and the method of handling revisions.

The fewer types of publications used, the simpler will be the task of issuing and controlling them. This reasoning suggests the use of only one type of publication. However, the diversified activities of a systems department produce results which require variations in presentation. These distinctions in requirements are satisfied by three types of publications, "Procedures," "Bulletins," and "Reports."

The publication entitled "Procedure" is the official standard operating instruction (see fig. 1). The information contained in it should be thoroughly investigated and carefully developed. Approvals should be obtained from those who are responsible for the operation of the "Procedure." In many cases actual tryouts should be conducted in order to uncover possible flaws in the system. Upon issuance, the "Procedure" becomes the plant policy and remains such until revised or recalled.

The nature of the "Procedure" gives rise to the necessity for the "Bulletin." The investigation and development of a system and the obtaining of ap-

provals and agreements require considerable time, for undue haste in the design and installation of operating procedures is false economy. However, occasions arise when the effectiveness of certain policies and procedures depends upon the speed of issuance and widespread distribution. Such information as a government directive requiring immediate compliance, a change in policy or procedure dictated by an emergency, an instruction needed to break a bottleneck or to bridge a gap in a system, requires much greater flexibility and faster action than is possible or advisable in the normal standard procedure. This departure from the normal concept of the "Procedure" is accomplished by the use of an official "Bulletin." The "Bulletin" (see fig. 2), carries the same weight of authority as the "Procedure" but is recognized as an emergency measure that will stand until circumstances no longer require it or until it is replaced by a standard "Procedure."

On many occasions the systems department is called upon to provide information to the plant management. This service might consist of gathering all the data on the manufacture of a certain product, or compiling a cost analysis to determine the economic advisability of a plant expansion. Publication of the results of these surveys and analyses is made in the form of a "Report." While the "Procedures" and "Bulletins" furnish operating instructions to the plant, the "Reports" supply information needed by management for establishing policies and making decisions.

It is important to the success of a systems program that the systems engineers be in a position to help create operating and management policies rather than merely follow instructions that are handed down. The value of this arrangement becomes apparent when it is considered that intelligent forming of policy and procedure depends to a great extent upon familiarity with details of operation. When managers constantly confer with the systems engineer, it serves the double purpose of keeping the plant manager properly informed on details and the systems engineer informed on overall managerial planning. The actual conception of new policies and procedures then has a better chance to take place on a well-balanced and thoroughly thought-out basis.

Before launching a systems program, management should consider three vital responsibilities it must carry. First, the conception of systems, systems engineers and procedure writing should be thoroughly explained to all in the organization who are concerned. Generally, all persons in any supervisory capacity are concerned with systems installations. The explanation should be made by plant executives themselves if full emphasis is to be had. A clear understanding of the aims of the systems program, and the knowledge that it is management's wish to have it fully carried out, is one of the essentials to successful systems installation and application.

Second, it is highly desirable that management weigh the merits of systematizing its organization against the cost of that systematizing. It must be understood that it is a long range program, and once the decision is made the program should be followed through completely. Management's third responsibility is to support the systems department in all its activity. The extent to which management accepts these responsibilities determines the degree of success achieved through written procedures.

If a proper balance exists, with management aggressively sponsoring and the systems department personnel adequately supporting, then these definite results are assured: (1) Reduction of operating costs well below that possible without systems control, and (2) increased efficiency of operations resulting in shortened delivery cycles and increased customer satisfaction. In short, a properly organized systems department, working as a management adjunct, will guarantee a competitive organization if management plans it that way.

Shapes and Sizes of Cupola Tuyeres

A DISCUSSION of factors affecting the shape and sizes of tuyeres in cupolas was presented at the recent Congress of the Assn. Technique de Fonderie at Paris, by G. Joly, chief foundry metallurgist, Centre Technique des Industries de la Fonderie. In this discussion, according to the Foundry Trade Journal, London (Nov. 21, 1946), it was pointed out that most cupola experts assert that the ratio of the total cross-sectional area of the tuyeres to the internal section of the cupola should be correspondingly smaller, the greater the diameter of the furnace. The application of this rule leads in some cases to blast speeds at the tuyere orifices being higher in small cupolas than in the large ones. This is increasingly illogical when it is necessary to have blast speeds correspondingly higher in a cupola of increased diameter.

Experience having shown that all cupolas which operate with a high coke charge have, for equal diameters, a greater tuyere section, it is logical to make the ratio of the total cross-sectional area of the tuyeres to the internal section of the cupola, dependent on the coke split between the charges. The following equation shows this, where S is the internal section of the cupola; *s*, the total area of the tuyeres, and p is the percentage of coke between the charges:

$$\frac{S}{s} = \frac{100}{p} \quad \text{or} \quad \frac{s}{S} = \frac{p}{100}$$

Thus (1) the ratio of the internal section of the cupola to the total cross-sectional area of the tuyeres varies inversely with the percentage of coke used between the charges, and (2) the section of the tuyeres expressed as a percentage of the section of the cupola by the same figure as the percentage of the coke splits.

Starting from the total section of the tuyeres as determined by the above formula, it is possible to determine the number of tuyeres by basing each of them at a diameter set between 4.8 to 6.4 in.

To insure that the blast may be properly spread over the whole of the internal section of the cupola, and that the tuyeres may be constantly maintained in good condition, it is recommended that double autoslagging tuyeres be used, and that they be supplied with a separate blast, in each of which the blast output is maintained at a fixed value by the operation of a valve.

The above principles, which have been applied in practice for the last 3 yr in some French foundries, have invariably yielded excellent results.

Battery Powered Aluminum Flash Welder

ALTHOUGH stored energy has been used extensively for the resistance welding of aluminum, its application has been confined to fairly light sections and to such operations as spotwelding. The reason for the use of stored energy is the excessive power needed for welding aluminum. Stored energy machines have the ability to provide high welding current rates with a considerably lower line load than ac machines. What is believed to be the first storage battery powered, stored energy flash welder has just been announced by Progressive Welder Co., 3050 E. Outer Drive, Detroit.

Of the three basic types of stored energy machines—magnetic, condenser discharge, and battery powered—only the battery type lends itself to flash welding since this demands a continued current flow rather than a single shot of short duration as is provided in the other types. In addition, another problem presented when flash welding aluminum is the extremely rapid upset required as compared with other materials. This calls for high rates of acceleration and deceleration in the upset mechanism combined with high upset forces. This problem was met in the Progressive machine through the use of a new type of gearing and clutch.

Shown in fig. 1 is the new machine flash welding miter joints of extruded aluminum window sash. To do this on an ac machine would have required a peak demand of at least 500 kva single phase at low power factor. The new battery powered machine does the job with a maximum line demand of only 18 kva to keep batteries charged, balanced on three phases and at approximately 90 pct power factor. This is about the same power requirement as for a 10 to 15 hp three-phase motor.

The machine is shown complete in fig. 2. At the right is the flash welder proper, an RWMA size 3, cam-operated machine. In the center is a 16-cell 8-v water-cooled battery power pack. At the left is the battery charger and charger control assembly. The power pack supplies up to 38,000 amp.

The combined use of a Reeves variable drive, a Cone-Drive gear speed reducer and a Fawick air clutch brake take care of the high acceleration, high upset forces, and high deceleration required. Chief reason is that the extremely high load-carrying capacity of the gearing also permits the use of a highly compact gear box, greatly reducing inertia forces at the speeds involved. When flash welding aluminum, speeds are 5 to 20 times as great as for steel since the flash weld cycle is approximately 1/3 to 1 sec, compared to 3 to 60 sec for steel.

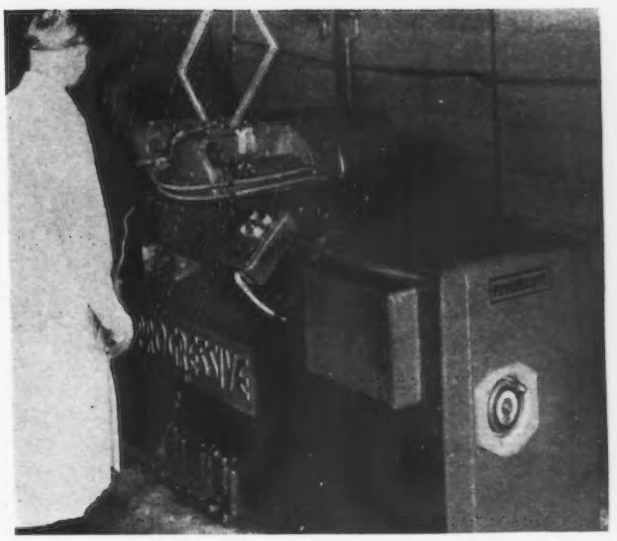


FIG. 1—Manufacture of window frames from extruded aluminum sections is typical of the operations which may now be performed economically by flash welding.

Further, the cam follower roller is carried on a pivoted arm which is connected by a link to the moving platen. This construction absorbs the tangential component developed as the roller hits the upset block in the cam. It thus eliminates the resultant lateral thrust which might tend to make the moving platen bind in its ways.

Aside from these advantages, the battery-operated flash welder has also demonstrated several other useful characteristics in service to date. Apparently it is far less critical as to control requirements when welding metals than are ac machines. A variation of ± 20 pct in operating voltage or of ± 30 pct in platen feed rate is apparently permissible without affecting weld quality. Again, where an ac machine may often have to be held to ± 1/100 sec variation in upset current duration, the time may be varied on the battery machine from 1/20 to 1/6 sec without affecting the quality of the weld.

Current control is through the conventional Progressive storage battery system. This comprises a controller contactor based on the carbon pile principle and a simple rheostat to adjust welding current. Voltage may be varied in larger amounts by alteration in battery connections, series, series-parallel, and parallel. The contactor, located within the machine frame, breaks heavy currents without arcing.

FIG. 2—The complete flash welding unit is made up from three major components, shown, right to left, are the welder itself, the 8-v water-cooled battery pack, and the battery charger and control equipment.

Casting

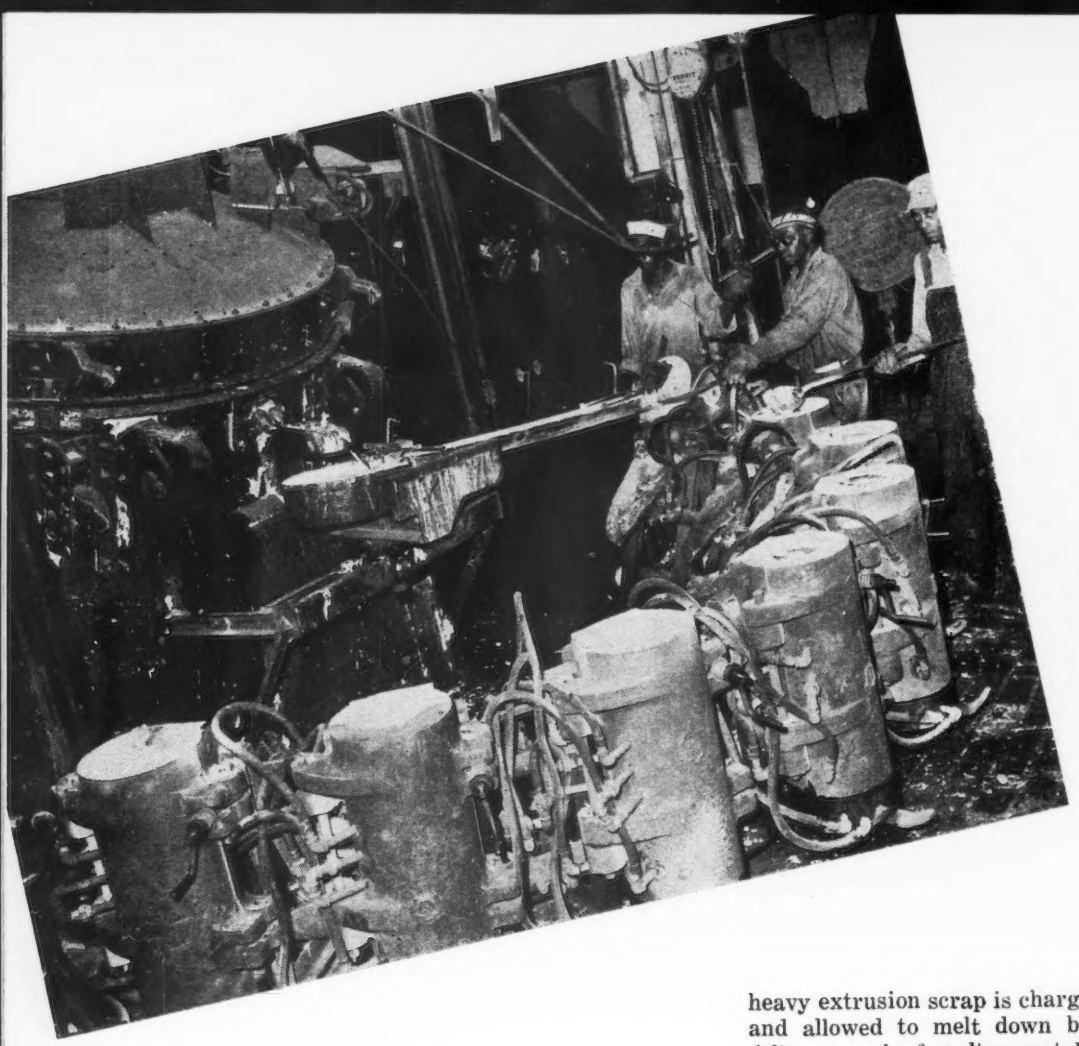


FIG. 1—Casting aluminum billets in book type molds. The spout is moved progressively from mold to mold.

By R. W. GRAHAM
Chief Metallurgist, Aluminum & Brass Div., Harvey Machine Co., Los Angeles

PRODUCING aluminum billets for use in an extruding shop involves practices and equipment not generally associated with aluminum foundry operations. The methods employed to cast cylindrical billets ranging in size from 4¾ to 13 in. in diam will be described in this article. These billets are cast to serve five extrusion presses in capacities from 1650 to 3850 tons. Primary melting and alloying is done in two 25,000-lb capacity oil-fired reverberatory type furnaces. A solid wall divides the hearth of the furnace into two chambers, a melting chamber and a pouring chamber. Ports at the bottom of the dividing wall just above the hearth bottom permit the molten metal to flow from the melting hearth to the pouring hearth. The purpose of this construction is to permit all charging, alloying and melting to be done in one chamber, confining the dross and dirt formed by these operations to this chamber. The clean molten metal flows into the pouring chamber where the temperature can be regulated independent of the melting section, giving more uniform pouring temperature. Temperature control during melting and pouring is very important, as the metal tends to absorb gas and form oxides with increasing temperatures.

At the start of melting operations, virgin pig or heavy extrusion scrap is charged on the melting hearth and allowed to melt down before further charging. After a pool of molten metal has formed, additional components may be charged, including light scrap which is submerged in the molten metal to prevent excessive oxide formation as a result of the burning of the light scrap. Hardeners in the form of aluminum plus varying amounts of copper manganese, silicon and chromium, depending upon the alloy being remelted, are added in quantities sufficient to produce the proper alloy. Magnesium is not added to the charge until the furnace is full and the charge completely molten to prevent loss of magnesium and formation of oxides which would occur if the magnesium were added during the melting-down period when excessive temperatures may prevail.

After the charge is completely molten and all charge elements have been added, the bath is thoroughly stirred to minimize any segregation of the alloying elements, particularly copper. When stirring is complete, anhydrous aluminum chloride in the proportion of approximately ½ lb of flux to 1000 lb of metal is introduced into the molten metal by means of phosphorizers which are moved back and forth under the surface of the metal until the reaction is complete. The resulting dross is then carefully skimmed from the surface of the metal. When skimming is completed, the metal is allowed to stand for about 1 hr to equalize temperatures before pouring.

Cover-heated, electric portable holding ladles are used for transferring the metal from the melting furnaces to the pouring stations. This type ladle allows much closer temperature control during pouring than if pouring were done directly from the furnace or from unheated ladles. Two ladles full of metal are drawn off from a full furnace and the furnace is immediately

Aluminum Billets for Extruding

Melting and casting of aluminum billets to meet the exacting demands of extruding operations are discussed in this article. Use of book type molds and the direct chill process are covered in detail.

recharged with the same amount of metal so that a semicontinuous melting operation is carried out.

Two types of billet casting equipment are used in the plant. Billets up to 6¼ in. in diam are cast in book-type molds, while billets larger than 6¼ in. and up to 13 in. diam are cast by the newer direct chill or DC process. While the direct chill process produces a much better billet than the book mold and produces a long billet which may be economically sawed to the various lengths required for extrusion, it is not at this time economical or commercially practicable to pour extrusion billets much smaller in diameter than 6 in.

The book type molds are 28 in. in length and are cast of iron with internal piping to permit circulation of water for cooling. Eight molds are set up on trunnions in an arc arrangement. The holding ladle is set at a central point in the arc and is elevated for pouring by means of a hydraulic lift. The metal pours from the spout of the ladle into a holding bowl which compensates for small changes in the rate of flow of the metal. Metal is carried from the holding bowl to each mold on the arc by means of an angle iron trough mounted on a swivel. This unit is shown in operation in fig. 1.

At the start of pouring, each individual mold is positioned at about 40° from vertical (see fig. 2), to permit transfer of the metal into the mold with a minimum of agitation, thus preventing formation of harmful oxide film. As the metal reaches the lip of the mold, the mold is slowly lowered to a vertical position and pouring is continued until the mold is full. Then the pouring trough is lifted and moved to the next mold.

As the metal in the mold cools, it shrinks and tends to form a pipe. To compensate for this shrinkage, metal is hand ladled from an electrically heated holding pot adjacent to the mold and is carefully and slowly poured into the mold until the metal is solid and shrinkage ceases, as shown in fig. 2. When the heading operation is completed, the billet is usually cold enough for removal from the mold. This is accomplished by opening the mold in book fashion and by lifting the billet out with a pair of tongs, as shown in fig. 3. The mold is then closed and made ready for the next pour.

The second method of casting used in this plant is known as the DC or direct-chill process. There are several variations of this type of casting now in use in the aluminum and brass industry, all of which have been rather thoroughly described in previous articles.[1] Casting machines of this type may be continuous or semicontinuous, the machines in this plant being of the semicontinuous type. The molds are cylindrical in shape and of the same diameter as the billets to be poured. The length of the mold is from 10 to 12 in. with a thickness of ¼ in. They may be constructed of aluminum or bronze sheet formed and welded or machined from centrifugal castings. Four molds are mounted on one pouring unit to permit pouring four

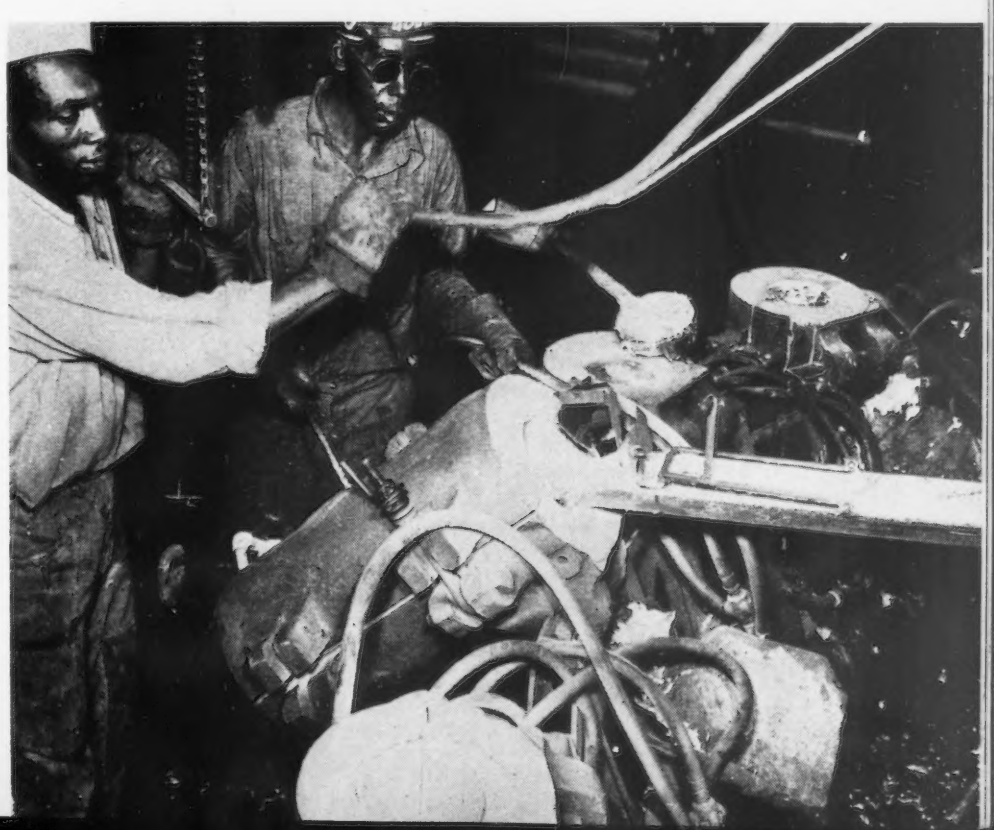


FIG. 2—Starting a cast in a book type mold. The mold is tilted at the start of the pour and then as pouring progresses is lowered to a vertical position. A worker in the background is heading a poured mold with a hand ladle.

o o o

ABOVE

FIG. 3—Removing a billet from a book type mold.

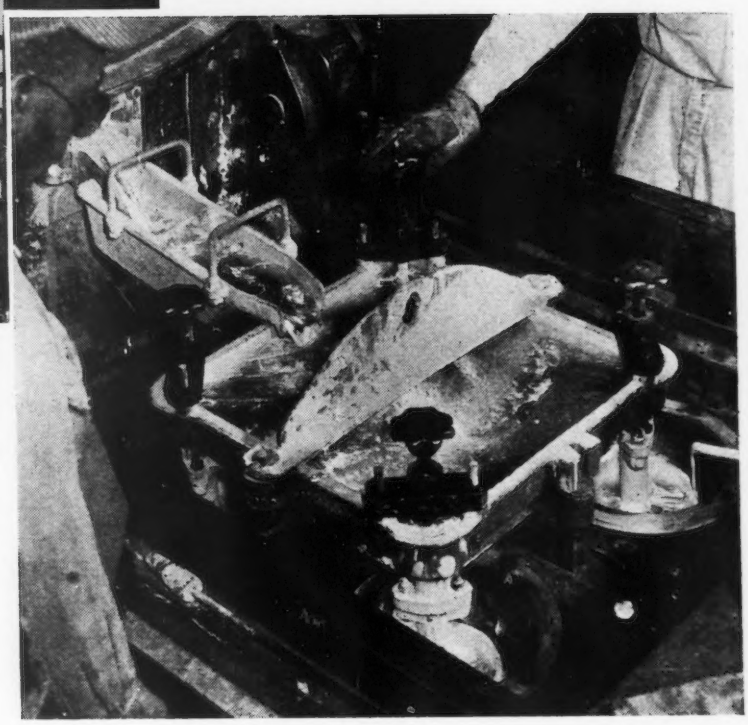
o o o

o o o

BELOW

FIG. 4—Pouring and dispersion troughs on a direct chill casting unit. The four valves at the corners of the trough control the flow of metal to each of the four molds.

o o o



billets simultaneously. This unit is shown in operation in fig. 4.

At the start of pouring, the holding ladles are tilted by means of a hydraulic lift and the metal is poured into a cast iron trough equipped with stainless steel screens to remove dirt and other particles from the metal as it flows to a dispersion trough set immediately above the molds, as shown in fig. 4. The dispersion trough is square in shape and has at each corner a cone-shaped nozzle positioned so that nozzle openings are in the center of the mold about 6 in. below the top of the mold. Each nozzle has a valve control on the flow of metal so that the metal level may be controlled individually in each mold during pouring.

The initial metal poured into the molds is chilled on cast iron bottom blocks mounted on a hydraulic lift which form a bottom closure. Annular pipe rings, spraying water on the exterior surfaces of the mold, freeze the metal immediately in contact with the mold, forming a frozen shell with a molten center. When the metal in the mold rises to a point about 6 in. above the bottom block, the hydraulic lift is continuously lowered at a rate of from 2 to 10 in. per min, the exact rate depending on the alloy being poured.

As the bottom block emerges from the mold, the water from the spray rings comes into direct contact with the previously frozen shell causing solidification throughout the billet. Pouring continues until the billet reaches a length of about 11 ft, the length being limited only by the stroke of the hydraulic ram. At this point pouring stops, the billets are removed from the unit, and another group of molds is poured. The long billets produced by this process are most economical for extrusion production as they may be cut to any desired length or combination of lengths for the extrusion presses with a minimum of scrap from both ends and surface defects.

The hardeners used in making up the alloys are produced in the foundry in 350-lb graphite crucibles mounted in 500-lb oil-fired trunnion-type furnaces. Virgin pig or scrap is melted and the hardener metals such as copper, silicon and manganese are added to make alloys of 33 pct Cu, 20 pct Si, and 5 pct Mn. In this operation, as in the melting operation, careful melting, stirring, and skimming are essential to produce clean hardeners with a minimum of segregation. Graphite crucibles, although more expensive than iron crucibles, prevent a high iron pickup in the hardeners. Extensive use is made of the spectroscope to insure the quality of the metal.

[1] *"Continuous Casting,"* THE IRON AGE, *Apr.* 4, 1940, *p.* 31 *and Apr.* 11, *p.* 44; *Feb.* 24, 1944, *p.* 48.

Thread Rolling—

Theory and Practice

The various stresses imposed on thread rolling dies are analyzed herein, and practical information is given as to how these may be minimized or counteracted. Comparative testing for quantitative die life is discussed, as well as the various points to be observed in the selection of materials for the manufacture of die sets. The merits of grinding to produce die threads are also considered, as are the strength of die materials and the use of carbide dies.

By J. W. BATCHELDER
Ascutney, Vt.

THERE is a considerable difference between net die cost and the actual cost of dies per thousand screws rolled. Setup time or down time for frequent changing or adjusting of short life dies represents a loss of earnings, and is just as tangible a cost as money spent for dies.

Any treatment or feature that can be applied to thread rolling dies which yields benefits proportionately greater in value than the cost of such treatments, is economical and should be employed. There are a number of means available which, taken collectively, increase the life of the dies several times and possibly more, but do not increase the cost in nearly the same proportion.

The first part of this three part article (Dec. 19, 1946, p. 58) discussed the history of thread rolling machines, the types now in use, and the possibilities of applying some of the hitherto impractical designs as a result of modern manufacturing techniques.

Until the quality of the dies can be brought up to the point where fairly uniform die life is obtained, it is utterly impossible to determine whether any particular type of steel or treatment is beneficial or detrimental. Almost any grade of tool steel will be found to possess adequate physical strength, and therefore, fatigue resistance becomes a dominating factor. The fatigue resistance of tool steels varies considerably, according to the grade and heat treatment, when used for thread rolling die applications. Fatigue resistance derives from the endurance limit or maximum stress that can be repeatedly applied practically indefinitely. All thread rolling dies contain a certain amount of internal stress resulting from the methods used in manufacture. These stresses may be benign or malignant.

Benign stresses are those which are opposite to those induced when the dies are in service. Being opposite, the benign stresses tend to reduce or cancel the malignant stresses and, therefore, serve as stress reducers. Surface compression stresses are benign in character. This is a result of the fact that most fatigue failures are associated with tensile and seldom with compressive stresses. The molecular cohesion is aided by compressive loading up to the point where its resistance to shear is overcome. The opposite is true with tensile loads. Even tiny cracks set up a vicious cycle by reducing the distance from the extreme fibres to the neutral axis, with the resulting increase of stress at the roots of the cracks, which is the point least able to withstand the stress. Surface cracks are, therefore, much more detrimental when the surface is subjected to tensile instead of compressive stresses.

In inducing initial compression stresses in the working surfaces of thread rolling dies, the tensile stresses imposed when in service are at first absorbed by reducing the compressive stress to zero. The resulting tensile stress is, therefore, diminished by the amount of the initial compressive stress which is, therefore, benign or desirable. The resulting stress is the algebraic sum of the compressive and tensile stress. The very definite object in reducing the tensile stresses is to bring them within the endurance limit and therefore acquire practically indefinite die life.

There are strong indications that this is entirely possible, as indicated by occasional phenomenally long die life experienced in several plants. A number of entirely practical considerations must be exercised before such gratifying results can be expected to become common, but enough dies have rolled 3½ million or so screws per edge, to prove what can be accomplished when sufficient consideration and control is exercised.

In the first place the die threads must be relieved, insofar as possible, of all sidewise, tipping or overturning forces, and subjected solely to direct compression toward the body of the die. This is necessary because overturning forces on the die threads, although causing compressive stresses on one flank of the thread, also cause tensile stresses on the opposite thread flanks, and it is the tensile stresses that are malignant. When the die threads are forced directly toward the body of the die, both flanks of the threads are in compression which effectively limits fatigue.

Obviously it is important that the work should track perfectly with the die threads as it rolls along over the faces of the dies. The grooves made in the blank by one of the dies must track perfectly with the grooves made by the other die if the overturning forces on the die threads are to be minimized. The thread profiles

on both dies should therefore be alike and both dies should have exactly the same pitch. The height of all threads on both dies must be the same, the thread profiles must be uniform and the helix angle equal and constant the entire length of both dies. These conditions are easily met with die threads properly ground and practically impossible of attainment when the threads are cut before heat treatment, regardless of whether or not they are subsequently lapped.

Accurate and careful setup is also essential to long die life. When the grooves in the body of the blank made by one of a pair of dies fail to line up with the grooves made by the other die, but are slightly offset one from the other, then each time the offset portion of the threads in the blank rolls over the die threads, the latter receives a twisting action. This is much the same as if the die threads were gripped by a pair of pliers and then subjected to a very violent twist. Points on opposite thread flanks a slight distance apart are subjected to alternate compression and tensile stresses at periodic intervals along the faces of the dies, a distance apart determined by the pitch circumference of the blank. Invariably the die threads fail prematurely from elastic fatigue at these periodic points of contact between the die threads and offset points on the work threads.

It is particularly important that the die threads of both of a mating pair of dies correspond exactly, especially at the portion of the dies where the peak resistance to penetration occurs. In only this way can all of the die threads equally share the extreme rolling loads, thus minimizing stress concentration of a tensile nature. With the attainment of reasonably accurate and uniform die threads, and by exercising care in setup, the die life will be found to be considerably extended, but what is more important, it will be much more uniform between different sets of dies. Uniform die life is absolutely essential when determining the relative merits of different steels, heat treatments, and other processing procedures.

Die Life Tests

In experimenting with thread rolling dies with the object of increasing die life and reducing the die cost per thousand screws accordingly, it is very important that the feature of the test be isolated for direct comparison with an arbitrarily selected standard. It is likewise equally important that not more than one variable be involved in the comparison. Uniform die life, that is, demonstrated ability to duplicate results, is the only dependable indication that all of the factors influencing die life have become understood, identified and brought under control. If two variables are permitted to endure during a test, and one is favorable while the other is unfavorable, they may completely balance each other in the final result. When this occurs the favorable feature remains undetected and the unfavorable aspect continues to detract from the die life. Data on die life containing wide unexplainable variations should be disregarded except as an indication that one or more important factors influencing die life are not being properly controlled.

Two methods are feasible for conducting comparative die life tests. The more common method is simply to run a number of pairs of dies being compared on the same machine, first carefully checking it to be certain it is in good alignment. It is also desirable that the same person make all of the setups. The machine should run at the same speed throughout all tests and the same type and hardness of wire should be used for all blanks. Since rolling loads vary with blank diameter and thread pitch, it is also desirable to select a commonly used size and pitch of screw to be run. Records of all tests should be complete in all of the above respects and include notations of all other factors that may influence the die life, so that the tests can be extended on a comparable basis from time to time, as new ideas develop worthy of investigation by actual tests.

The other method of obtaining a comparison of thread rolling dies is to operate the two different dies together on the same machine. In this way the two dies are operated under as nearly identical conditions as possible. Quantitative die life data cannot, however, be obtained in this manner because failure of one die terminates the test, the remaining life of the other die being unknown. Since it is either impractical or impossible to control all factors influencing die life to the nth degree, a more logical approach is to exercise a reasonable degree of care in making and testing the dies and include several duplicate sets of dies in the series of experimental runs. Mortality curves plotted regarding individuals, electric light bulbs, ball bearings and thread rolling dies all bear a distinct resemblance. It is, therefore, much safer to judge test results on a basis of statistical averages than on individual pairs of dies. The more supposedly identical pairs of dies in each group, the more dependable will be the statistical average.

It is impossible to completely balance out the overturning forces on die threads at the ends of the blanks, and also along the top edges of the dies, where the blanks press against only one flank of the die threads, as illustrated in figs. 9 and 10. At best this condition can only be alleviated, which is accomplished by breaking the overturning force up into increments and distributing it over several die threads, instead of allowing it to become concentrated on only one thread. At the ends of the blanks a chamfer is provided which embraces more than one thread pitch. The more thread pitches thus embraced, the less the degree of overturning force on any single die thread. There is no need of making the diameter of the chamfer any less than the root diameter of the finished screw. This usually results in a point chamfer about 30° on a side or 60° included angle. The smaller the point angle, the longer the life of the die along its face where the blanks terminate.

The edges of the dies are chamfered for the same reason and to the same degree. The depth of the chamfer should be at least equal to or preferably a little greater than half the depth of the threads. The length of the die chamfer, across the die face, should include as many thread pitches as permissible, depending on how close the screw threads must come to the head. The less the die chamfer, the shorter the die life. A good rule to follow with respect to the extent of both die and screw chamfers is to make them equal to about one and one-half to two times the pitch of the thread being rolled.

Aside from uneven load distribution, dies are subject to varying degrees of internal stress due to differential expansion and contraction resulting from heat treatment. This condition is aggravated when the die threads are milled before the dies are hardened, as a

result of the increase in area on the threaded surface, which accelerates the transmission of heat.

In order to alleviate these internal stresses it is important that the dies be stabilized at as high a temperature as practical without drawing down the hardness. In some cases it is recommended that two stabilization treatments be used—one at a high temperature for a few hours and the other at a lower temperature for a longer period of time.

Another frequent source of high internal stresses that often proves to be troublesome, is the presence of retained austenite. The high carbon high chromium steels are subject to retention of austenite to a greater degree than the high speed steels. High speed steels should be given a double draw, and an interrupted quench is recommended.

Austenite changes to martensite with time and temperature variations and also somewhat due to repeated applications of loads, such as operation in a thread roller. Not only is untempered martensite brittle but it occupies more space than austenite. The internal stress developed by further transformation after the die is completed, or during operation, or both, is a direct result of the volumetric change.

Every effort should be made to complete the austenitic transformation before the dies are put to use. This can be accomplished by subjecting the dies to alternating high and low temperatures. The smaller the difference in temperature, the more repetitions must be used to complete the transformation. Other things being equal, more repetitions are generally necessary for the high carbon high chromium steels than for the high speed steel. In applying alternating high and low temperatures the high temperature should be last. The cost of minimizing internal stress is low compared with the increase in die life that can be expected, particularly since these internal stresses can, when permitted, reach a very high degree. For example, the transverse rupture strength of molybdenum high speed steel is approximately 600,000 psi when properly heat treated. When pieces of this material crack, or checks can be detected in the surface, it is evident that stresses have been developed exceeding the physical properties of the material. It is also possible that stresses can be present to a degree slightly below the rupture strength of the material, and since they have not been quite able to cause fractures, remain undetected. Inspection with apparatus capable of revealing microscopic surface fractures is strongly recommended, both during manufacture and as a final check.

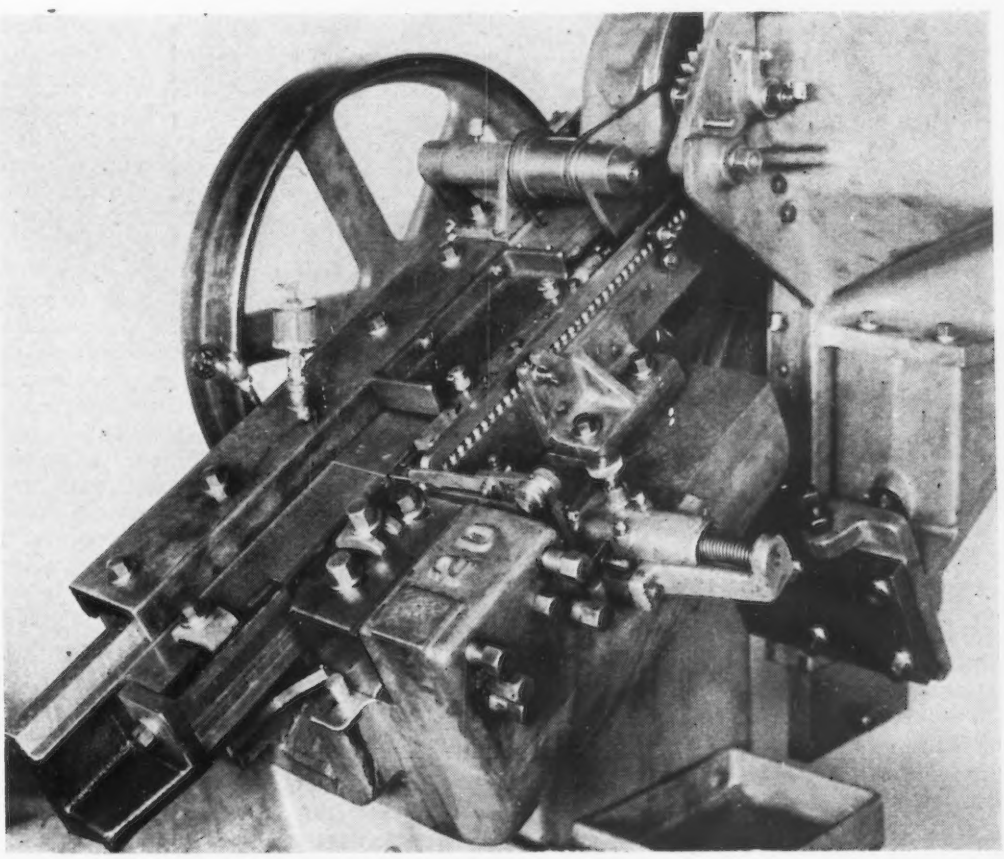


FIG. 8—Typical of the flat die type of thread rolling machine is this Waterbury Farrel inclined bed machine in which the arrangement of the dies and the die adjusting screws are clearly visible.

Selection of Steel

When buying steel of the high speed and high carbon high chromium types for thread rolling dies, it is well to acquaint the mill with the nature of the intended use, and further to include specific limits to carbide segregation. Maintenance of carbide segregation below specific limits is essential, as otherwise the dies will not possess even adequate physical properties.

When the ingot of tool steel is poured in the mold at the mill, the inclusions segregate and high melting point constituents are precipitated at the center of the ingot, which portion is the last to solidify. When the ingot is subsequently rolled down, the pattern of the

ingot remains, although elongated. This central portion of the bars is very low in physical properties. During the rolling process the carbides are drawn out in the form of stringers which, if not sufficiently broken up and distributed, constitute planes of weakness. Since the extreme fibres receive the greatest stress in torsion or bending, it is particularly important that any segregation of carbide stringers that may be present should lie far below the surface in a region subjected only to minor stresses, which zone is in the vicinity of the neutral axis of the dies.

Both the high speed and high carbon high chromium types of steel develop their superior physical strength and fatigue resistance only when the carbides are well broken up and dispersed throughout the matrix to an extent whereby not many adjacent carbides line up. It is therefore obvious that in cases where it is ex-

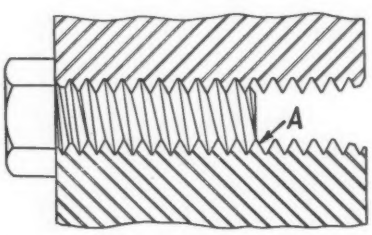


FIG. 9—If screw blanks are not chamfered at their tips, a great overturning force will be exerted on one side of the die threads, as there will be no counterbalancing force at point A.

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pedient to cut down or slice large bars to make small dies, it is extremely important that a minimum of material be removed from the side to which the threads are to be applied, and in no case should threads be made in the inside surfaces of sliced bars. Preferably large ingots should be selected which involve more hammering in reduction to the desired size, resulting in better carbide distribution. This is particularly important when large sizes of round dies are contemplated, which for best results should be pancaked forgings. When taking all of the extras into consideration, forgings are less expensive than large diameter rolled bars.

When making curved dies having threads on their convex sides, it is much better to select rectangular bar stock and have it bent, than to bore out the center of a large round section and cut it into segments. It is difficult to break up the carbide stringers to a depth exceeding 1 or 1¼ in. below the surface of large sections, and threads cut in the convex sides of die blanks machined from large round bars are almost certain to fall within a region of the ingot pattern.

If it is desirable to reclaim the dies, the carbides in the blanks must be originally broken up to a lower depth below the surface, which depth depends on the number of times the dies are to be reworked. When salvaging dies, it is definitely advantageous to completely remove the old threads, and an allowance for this amount of metal removal should be made when setting up specifications regarding the minimum depth of segregation.

When die threads have fatigued to the point where they spall out, it can safely be assumed that the fatigued condition extends into the body of the die. Reconditioning efforts are in vain unless the new threads are applied in good sound metal which has not become partially fatigued. Inspection with apparatus capable of revealing macroscopic fatigue cracks will show that apparently sound threads adjacent to broken threads on used dies are permeated with fatigue cracks. Frequently these cracks are still perceptible after the old threads have been completely removed, which shows that fatigue stresses extend below the die thread roots. It is erroneous to assume that the dies can be restored by grinding only enough to remove spalling on the die thread crests. The number of additional screws rolled by dies reclaimed in this manner will not be worth the cost invoved.

It is customary practice when blanking out silverware to remove the blanking dies from the presses at intervals of a hundred or so gross, and subject the dies to a stress relieving treatment. Much longer die life is said to result from this practice. It is not known if this would work to advantage with thread rolling dies, but it seems to be well worth a trial.

Unfortunately the selection of thread rolling die steel, particularly for flat dies, has been largely confined to the nondeforming steels. Data are extremely scarce on the behavior of other steels having higher physical properties and proportionately higher endurance limits. No reliable data are available, and it is highly doubtful if any exist, relative to the exact merits of the various steels for use for thread rolling dies, exclusive of considerations concerned with manufacturing technique. Selection of the optimum steel for round dies has not been subject to nondeforming considerations, particularly in recent years, because of the prevalence of thread grinders.

Due to a definite deficiency in similar machine tools for flat dies the majority of them are at present being thread milled before heat treatment. Even the nondeforming steels distort much more in heat treatment than is permissible with most tools, including thread rolling dies. The amount of distortion depends to a great extent on the methods of heat treating employed. If the best possible results are desired, under a given set of conditions, all phases of the heat treating procedures should be understood and judiciously exercised.

Die stress during operation increases greatly with distortion and since die life diminishes rapidly with increased stress, especially when the stress is raised above the endurance limit, there is little to be gained by using a steel which might have potentially longer life, although unattainable due to great distortion. Thread grinding after heat treatment eliminates the importance of distortion, and the optimum die material is then determined on a basis of die life and thread grinding time.

Grinding Die Threads

All types of steel suitable for thread rolling dies can be thread ground, some types requiring more thread grinding time than others. From three to five times deeper cuts can be taken in high speed than in high carbon high chromium steels. Because uncontrolled factors have in the past greatly distorted the results of tests to determine the best all round die steel, or selections have been restricted to the nondeforming varieties, or both, it is not certain whether

the high speed or high carbon high chromium steels are best.

Opinions on the subject of the best die steel are quite plentiful, and if enough are collected, it becomes evident, from the contradictory nature of these opinions, that only extensive further research regarding this question will provide the true answers.

Dies ground with single point wheels, dressed in the conventional manner with diamonds, at present cost more to produce than milled dies, but the increase in die life resulting from decreased strain imposed on the dies, completely justifies this increased cost. Improved quality of the work, quicker setup and less down time for adjustments are also points in favor of dies made in this way.

By dressing the thread grinding wheels with dull or worn diamonds, the cutting points have far less tendency to burn or check the work, and substantially deeper roughing cuts can be taken, without injury to the dies. Sharp roots and uniform accurate thread forms are obtained by removal of the last few thousandths with wheels dressed in the conventional manner. Three thread grinders are necessary when employing this practice since two roughers just about equal the output of one finisher. This practice results in much less overall grinding time and proportionate reduction in cost.

The use of multiple point thread grinding wheels, where each successive point penetrates further into the work, permits still greater reduction in grinding time, the more so when roughing and finishing operations are conducted on separate machines. High carbon high chrome steel dies about 6 in. in diam have, it is reported, been thread ground in 3½ hr per pair, using multiple point wheels without preliminary roughing. The thread grinding time should be substantially less when using high speed steel and separate roughing and finishing technique. With ground thread rolling dies the increase in cost of using high speed steel, over that of high carbon high chromium steel, is more than offset by the faster grinding time permitted by high speed steel.

Dies can be thread ground to produce class 3 screws as easily as to produce class 2. By holding the thread depth tolerance a little closer, class 4 work can be rolled. Since more accurate dies last longer, being less subject to fatigue stresses, it is possible to produce class 3 screws at a cost below that of rolling class 2 work with inferior dies. More accurately threaded screws may not bring about a direct increase in prices, but they can bring about an increase in revenue by effectively meeting competition and making an increase in the volume of business possible with equal prices.

Crusher dressing of thread grinding wheels holds considerable promise as an aid in thread grinding dies, particularly when considering multiple point wheels. With this method it is of course desirable to use a material for the crusher rolls which has the greatest resistance to abrasion by the wheel being dressed. It therefore follows that it is to be expected that the best material will be that having the greatest resistance to being ground. It is not likely that a type of material exists which can be easily thread ground and at the same time will possess considerable resistance to loss of form when used to dress thread grinder wheels. One master crusher roll, once formed accurately, can be used to make submaster crushers which should be quite suitable for roughing, and possibly also for the finishing of some classes of work.

The high carbon high chromium tool steels have been used heretofore for crusher rolls but due to the difficulty of grinding this material, both in thread and cylindrical grinders, high speed steel is becoming increasingly favored. Both molybdenum and tungsten high speed steels are equally suitable.

The process of milling thread rolling dies has received considerable attention over a long period of time. This method, after exhaustive treatment, fails to compare favorably with ground thread dies, which have received far less development attention.

When rolling threads in heat-treated blanks such as aircraft engine studs, the roots of the threads harden to a degree considerably more than the thread crests. The work roots reach a hardness of nearly 60 Rc when using blanks at 34 Rc. When thread rolling dies are drawn above 58 Rc, porcelanic characteristics are exhibited and these work roots therefore

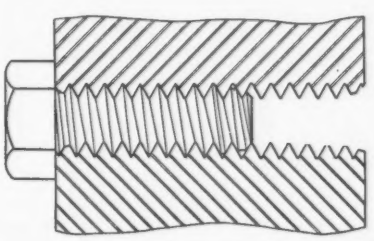

FIG. 10—By proper chamfering of the blank tips, the overturning forces exerted on the die thread flanks are broken into increments and distributed over two die threads.

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become as hard as the dies. The modulus of elasticity of both the dies and the work being rolled is the same. The roots of the threads being formed in the blanks must be depressed to or beyond the point where the stress developed in the blank exceeds the elastic limit of the material of which the blank is made. Were this not so, the blank would regain its original shape, due to elastic recovery of the blank material, after the blank loses contact with the dies. The elastic limit of the blank material heat treated to 34 Rc, varies with material, but 140,000 psi is not at all uncommon. The degree of surface depression of the die thread crests and work roots depends on the relative degrees of curvature of the work and dies, the body having the smaller degree of curvature receiving the most surface depression. The surface depression of the threads on large round dies is therefore less, under any given penetration force, than with small round dies.

The penetration force required for heat-treated blanks, being very much greater than for soft blanks, involves greater surface depression of the die thread crests with resulting increased working stresses at these points, which being considerably in excess of the endurance limit of the die material. accounts for the very short die life experienced when rolling heat-treated blanks.

Accurately threaded dies are essential when rolling this type of work in order to distribute the rolling load equally over all of the die threads. Otherwise the

higher or wider die threads will receive a disproportionate share of the rolling load and reach their fatigue limit far ahead of the lower or narrower die threads.

Strength of Die Materials

Impact resistance data are available for most of the steels from which thread rolling dies are likely to be made. Several different methods, which differ considerably, are being currently used for tabulating such data. It is therefore not always possible to compare impact strength figures submitted by different manufacturers of the same type of steel.

Such data indicate two toughness points for high carbon high chromium steel, depending on the drawing temperature and hardness. There is a tendency to direct too much attention to such impact data, which, since collected from tests on carefully prepared laboratory specimens, have no direct bearing in actual practice with thread rolling dies. The stresses developed in actual practice are of an entirely different character. Impact data are, at best, only suitable as a guide in selecting a place to start practical tests on thread rolling dies in order to establish the optimum hardness to use with each of the different types of steel.

Relative endurance limits of die steels would be more useful, were such data available, but unfortunately they are not. Most of the research in this respect has been conducted at 40 Rc or under, and with reversed stresses. Up to 40 Rc and with reversed stresses, the endurance limit increases roughly in proportion to the ultimate strength of the material. Experience with unidirectional stresses indicates that the endurance limit increases more nearly proportional to the elastic limit than to the ultimate strength. All steels become porcelanic above 42 Rc, accompanied by a marked increase in sensitivity to stress concentration, and a substantial decrease in crackless plasticity. It is doubtful that steel work hardens to any great extent much over 40 Rc, although small increases in hardness may on occasion be noted with certain steels. Any slight variations in hardness are much more likely to result from small differences in different hardness testers. It is advisable to check these frequently, if close readings are necessary.

It is well to bear in mind that there is no steel available made especially for thread rolling dies. All such dies are now being made from steels developed primarily for the purpose of cutting metal, where the operating conditions are entirely different from those encountered by thread rolling dies.

The principal factors influencing the development of present day tool steels have been resistance to high tip temperatures, superior hardness, and the ability to receive and retain a keen cutting edge. None of these characteristics are of value in thread rolling die applications, where fatigue resistance is the primary consideration. A number of tool steel manufacturers have recognized the possibilities of facilitating die manufacture and die life by developing a type of steel made expressly for thread rolling die applications. These steel companies have openly and repeatedly expressed a strong desire to cooperate with any large user of thread rolling dies in an effort to develop a superior die steel. Dependable die testing facilities have, so far as is known, been denied these steel companies, with the nature of the potential possibilities for improvement in this direction remaining unknown.

The degree of temperature rise in thread rolling dies can easily be determined by means of thermocouples. Tests of this sort have been made which show that the temperature rise in operation is not very great, being the greatest at the midpoint of the length of flat dies. The dies are cooled at their starting ends by the blanks themselves.

Cobalt is employed in some high speed steels to increase the heat resistance of the material. This is no advantage with thread rolling dies. In fact due to the increase in brittleness resulting from the use of cobalt, it is definitely disadvantageous in such applications.

Control of Grain Size

Vanadium is employed to assist in maintaining small grain size in case the steel be slightly overheated, and also to increase the red hardness. The factor most valuable in thread rolling die applications is increase in toughness through maintaining small grain size. It is thought by some metallurgists that too much vanadium can also result in increased brittleness over and above the gain in toughness due to the retardation of grain growth.

Both molybdenum and tungsten used as alloying elements have a good record in thread rolling die applications. Steel containing the latter is rich in tungsten carbides. Both ingredients, being refractory, impart higher degrees of resistance to burning when grinding threads in the materials of which they are a constituent. It is erroneous to assume that the refractory quality of molybdenum and tungsten is sufficiently pronounced as to make it impossible for the steel containing them to be burned or overheated in grinding. Apparently a great many believe this to be so, at least according to a check made recently on a wide assortment of new drills, reamers, milling cutters, etc. A surprisingly high proportion of them were found to be badly burned at the skin, as received from the manufacturer.

Carbide Dies

Tungsten carbide and the red hard cutting alloys are frequently suggested for thread rolling die applications. The former may possibly have high fatigue resistance and endurance limits. Data in this respect have been unavailable up to the present. Tungsten carbide at 5¢ per gram is too expensive for solid die blanks. The very high modulus of elasticity recommends it, but coupled with this characteristic is a low degree of crackless plasticity. To minimize the cost of die blanks relatively long, wide and thin strips of tungsten carbide could be applied to a less expensive core material, were a suitable material available. Hard carbide facings should be hot pressed to full density instead of depending on lower temperature sintering.

Considerable time has been devoted to finding a core material having reasonable compressive resistance which at the same time has approximately the same thermal coefficient of expansion as tungsten carbide. Alloys most nearly approaching the characteristics desired are those of the nickel iron group, the thermal coefficient of these being close enough to that of tungsten carbide to permit small dies to be made.

While copper brazing involves temperatures up to 2000°F, silver soldering, which can be applied at 1300°F, appears to be satisfactory from a viewpoint of strength of bond. Therefore, it is necessary that the thermal expansion of both hard carbide facings and

core material be aligned only up to about 1300°F if silver solder is used. It is important that the thickness of the film of silver be minimized, because the strength of the bond decreases rapidly when the film thickness exceeds 0.005 in.

The mounting of relatively small cutting tips made of hard carbide on steel shanks, has heretofore been a major problem because of the very high stresses set up in the tungsten carbide as a result of differential contraction when cooling from the brazing temperature. Sandwich materials such as constantan, rolled very thin and inserted between the hard carbide tips and the steel shanks, have alleviated the harmful results of differential contraction to a certain extent.

Grinding threads in tungsten carbide is no longer an impractical operation due to wartime developments in this field. This is done with diamond wheels which are trued with rotating diamond charged laps. Nevertheless thread grinding in tungsten carbide is relatively expensive.

Tungsten Carbide Dies

Even the softer and tougher grades of tungsten carbide are extremely brittle as compared with conventional thread rolling die materials at the hardness generally used. In order to attain the maximum potential life of hard carbide dies, they would have to be set up extremely accurately and treated with extreme care in all other respects. It is reported that tungsten carbide thread rolling dies have been manufactured and that they rolled a great many more screws than milled dies had heretofore produced. However, a minor jam in the thread roller broke the dies before their otherwise normal life span had been determined.

Regarding the red hard cutting alloys there seems to be little prospect that they would be at all satisfactory for thread rolling dies. Being extremely rich in carbides, molecular slip resistance is low, with the result that they fail under comparatively low shear loads, and therefore possess comparatively low compressive strength. The transverse rupture strength of these materials is also comparatively low, being in the vicinity of 80 000 to 100,000 psi as compared with about 350,000 psi for the weaker cemented carbides, 300,000 to 600,000 psi for carbon tool steel, depending on the fineness of the grain, or 500,000 to 700,000 psi for molybdenum high speed steel heat treated as follows:

Preheat—1550 to 1650°F
Raise quickly to—2150°F
Quench in salt bath or oil to—1100°F approx
Hold at tempering temperature for 3 hr
Stress relieve

These materials are not only difficult to grind, but some brands contain blow holes which result in stress concentrations if located near the surface of the die thread crests or in areas subjected to tensile stresses. A further disadvantage of the hard cutting materials is the likelihood that retained austenite will transform to martensite as a result of work hardening resulting from grinding. Development efforts applied to an expansion of knowledge regarding the manufacture of thread rolling dies from ferrous alloys, and improvements in these alloys, are almost certain to yield more immediate benefits at less cost than by jumping over these possibilities into comparatively little understood materials so far as thread rolling die applications are concerned.

The author will continue this discussion of thread rolling in the next issue.—Ed.

Sawing Metal by Electrolytic Action

A NEW way of cutting metal by a combination of electrical and mechanical action has been introduced at the Stalin works in the town of Gorki as reported in the *Engineers' Digest*, New York, October, 1946. It takes the place of circular saw work and is particularly suitable for heat-treated steels, hard alloys and thin tubes, but is also useful for ordinary sections.

From a table of typical results given below it will be seen that one electrolytic saw is able to do the work of several ordinary ones.

Section	Number of Cuts Per Hour By Circular Saw	By Electrolytic Saw	Increase in Production
½x1 in.	60	240	4 fold
1.2 in. diam	40	120	3 fold
0.8 in. diam	30	180	6 fold
½x¼ in.	100	1500	15 fold

The construction is as follows: The cutting element is a smooth disk, 0.025 to 0.040 in. thick, the diameter of which, according to the sizes of metal to be cut, may be up to 12 in. It is mounted similarly to an ordinary saw but rotates at 2000 to 3000 rpm, and is connected to the positive side of a dynamo. The metal to be cut is connected to the negative side and is insulated from the disk mountings.

A special electrolyte is pumped through a system of pipes to the point where cutting is to take place. The rotating disk is then pressed against the work by the action of a counterweight, and the electric current, in its passage from the work through the electrolyte to the disk, rapidly removes the metal by electrodynamic and electrochemicai action.

The voltage required is 18 to 30 v and the current, according to size of section, varies from 50 to 100 amp. Thus a dc welding set can be used to provide the necessary current.

This method can be employed on sections up to 2 in. thick. The speed of cutting varies greatly with thickness; with 1¾ in. thickness the feed is ½ ipm, with ⅝ in. thickness it is 12 ipm, while ¼ in. bronze can be cut at 28 ipm. This illustrates to what extent the speed of cutting depends upon the current density.

Despite the heavy currents used, there is a net saving of power on the cutting operations which, in the case of the works in question, is estimated to be 140,000 kw-hr per yr effected by the use of two electrolytic saws.

Designing For Silver Br

In designing joints to be silver brazed, attention must be paid to the amount of clearance between the mating parts. In this article the author discusses the various factors influencing this clearance, and the precautions to be observed in selecting coils to be used for induction heating of the brazing area.

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By JOHN B. ROSS
Handy & Harman, Los Angeles

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FIG. 1—One of the simplest methods of joining a collar, shown at center, to a shaft is by means of a ring of silver alloy. At left is shown the assembly after brazing.

TO obtain the maximum benefits from the use of silver brazing alloys, it is necessary that certain principles of design and procedure be followed. The design of the joint is largely governed by the shape of the parts to be joined. However, the selection of a lap or butt joint is controlled by such factors as ease and uniformity of penetration, reliability of the finished product and economy of operations.

While it must be admitted that butt joints can be brazed and will yield strong connections, it must also be realized that this joint requires the most careful preparation. Generally speaking, the lap type of joint proves more economical for production work as tolerances can be easily met with the forming and machining operations commonly employed in shops.

Successful use of silver brazing alloys require that clearance between the members joined be held between 0.002 and 0.003 in. if maximum strength is to be obtained. This fact has been determined by a large number of laboratory tests supplemented by actual field experience, and it has been found that as the joint is widened the strength decreases. For example, silver brazing alloys have a tensile strength of 45,000 to 60,000 psi. However, joints with a clearance of 0.001 to 0.003 in. will test over 100,000 psi and, depending on the material joined, will approach a maximum of 135,000 psi.

The reason for keeping this clearance small will be appreciated when it is realized that most of these joints are stressed in shear. If the cross-section of the alloy is too great, bending stresses will be set up, causing failure to occur at low values.

Silver brazing alloys, when molten, are very fluid and waterlike and, with joint clearances of a few thousandths of an inch, capillary action causes the alloy to flow throughout the joint area in all directions. It is unnecessary, and as a matter of fact objectionable, to have the large fillets which are common to other methods of metal joining. They do not add materially to the strength of the joint and certainly not in proportion to the cost.

The other critical dimension in the design of brazed lap joints is the depth of lap. This is usually set at three times the thickness of the thinner member joined. In the case of dissimilar metals, it may be necessary to calculate this value. This may be done by computing the strength (either total or on a unit length basis) of the weaker member and equating it to the area of braze multiplied by the unit shear strength of the brazing alloy (using a unit shear strength of the brazing alloy of 25,000 psi), and the factor of safety.

In calculating the area in this equation, the length of joint will be known but the depth of lap will be unknown. By solving for this unknown, the necessary depth of lap will be found. The factor of safety may be taken as between two and five, depending upon service conditions and the type of stresses involved. For low stresses and static loading, a value of two will be sufficient; where dynamic stresses are involved, a higher value should be employed.

These same figures plus the clearance of the joint will permit the calculating of the theoretical quantity of alloy necessary to make the joint.

Lap or shear type joints are more widely used in silver brazing, and with tubular or round members they are particularly adapted to induction heating. They have the advantage of providing a bonding area which can be varied to meet specific requirements and a greater safety factor against breakage and leakage

Brazing With Induction Heating

can be employed. Lap joints can be easily assembled and permit greater opportunity for the support of the joint members in maintaining proper clearances.

As stated, in order to produce maximum strength of joints, a clearance of 0.001 to 0.003 in. is required. This is true, however, only when both parts of the joint are made of metals having nearly equal coefficients of thermal expansion. Also, it is assumed that the joint members are uniformly heated at a relatively slow rate. If these conditions are not met, then it is necessary to modify the 0.001 to 0.003-in. clearance, and the direction of change; that is, whether a greater or less clearance should be employed will depend upon the conditions involved.

Take, for example, the joining of a metal having a relatively high thermal coefficient of expansion, such as a bronze bushing into a steel sleeve. On certain diameters it would be possible, with even 0.003-in. clearance on a side, to expand the bronze bushing upon heating to such a degree that the fit at the interface of the bronze and steel tube will be sufficiently tight to prevent actual flow of the alloy into the joint. Greater initial clearance of joint is therefore necessary. If the reverse relationship of metals is employed, that is, the joining of steel tubes inside bronze sleeves, less clearance obviously would be indicated in order to have good capillary clearance.

Assume that two tubular members of metals having the same or similar coefficients of thermal expansion are being joined, and induction heating is employed to heat the parts. If the coil is placed around the outside member it will get hotter more rapidly than the inside member, causing the former to expand so that a silver brazed joint of intermediate strength will result. A tighter fit, even approaching as much as 0.005 in. interference of parts could be tolerated. Parts that have a slight press fit of the joint members have the additional advantage of serving as their own jig in keeping them in proper alignment during the heating operation. Also, better heat transfer from one member to the other is possible. If the heating coil were placed inside the tube the reverse condition would develop and, therefore, a greater clearance would be indicated.

Very important in connection with induction brazing utilizing silver brazing alloys and closely associated with the design and fit of the joint are the necessary considerations for applying the alloy. Due to the high degree of ductility and malleability of silver brazing alloys, they can be fabricated into a wide variety of sizes and shapes, thus making it possible to obtain them in the form most convenient and economical for the different conditions under which they are to be used. With the acceptance of these alloys for use in high speed, large quantity production, the use of preplaced inserts of alloys is gaining considerable favor.

When tubular members and fittings are to be joined,

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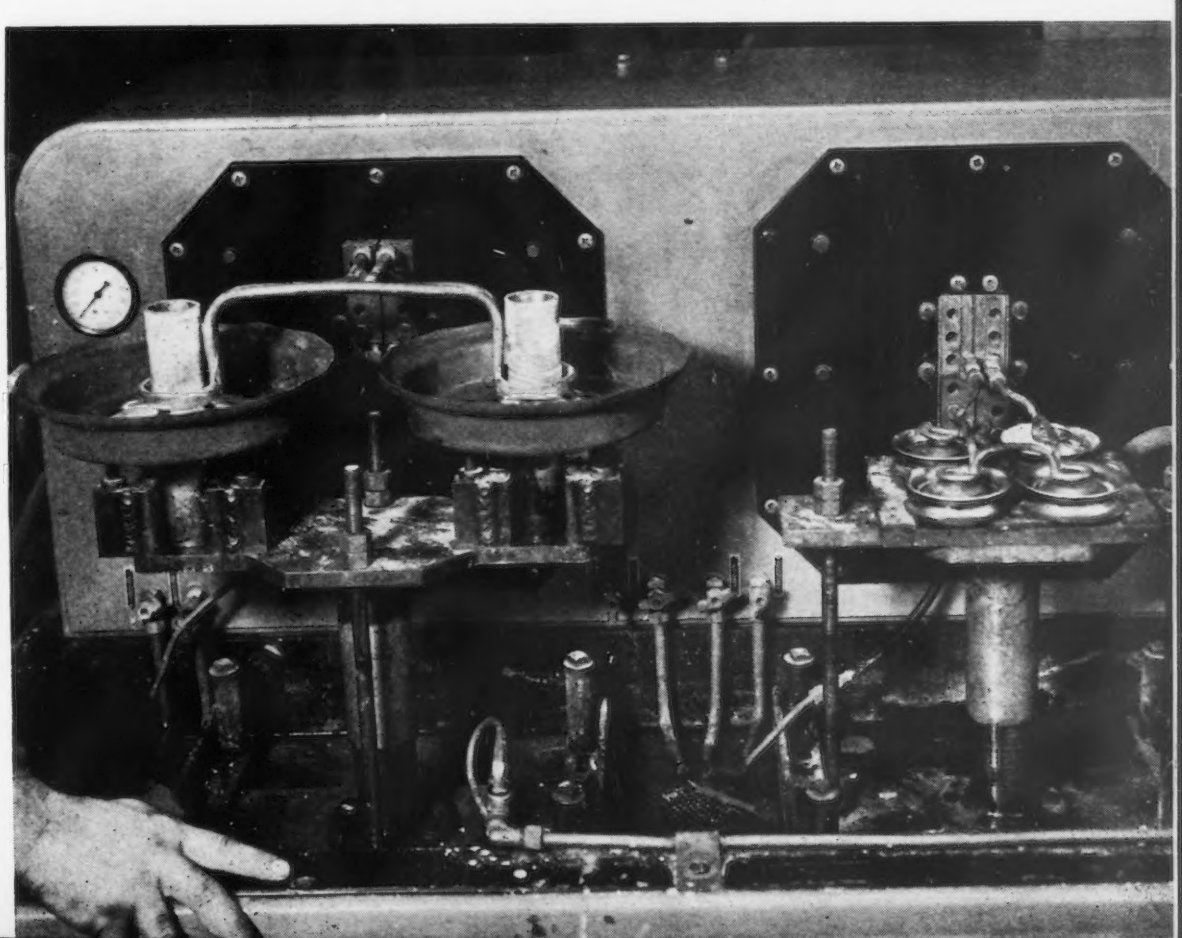

FIG. 2—Fast operation is made possible by the use of air-operated elevators which position the work rapidly and accurately. These are examples of the use of single-turn coils.

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rings can be made from rectangular strips or round wire, and inserted in grooves cut in the fittings before assembling and heating. The ring inserts must be large enough to provide sufficient alloy to completely fill the joint, and alloy a small excess. These rings need not always be inserted in grooves but can be placed on top of the members right at the joint.

The insertion of sheet from 0.003 to 0.010-in. thick into the joint gives good results when joining members with lap, scarf or butt joints. Washers may be made from thin sheets and used as inserts for joining flanges, spuds and similar type fittings to tanks and other articles. While washers, when blanked from sheet, are more expensive than rings, at the present time there are methods being developed for coining rings and spirally winding strip to make washers so that they will be on a more nearly equal cost basis with rings.

When induction heating is employed for making a silver brazed joint, the use of preplaced rings and inserts is almost always necessary. Fortunately there are a number of advantages to this technique such as:

(1) Control of amount of alloy used, thus eliminating waste.

(2) Better assurance that the alloy will be properly distributed over the joint surfaces and all parts will be wetted.

(3) The appearance of the alloy at the edge of the joint is a good indication that the joint has been heated sufficiently to insure a good bond, thus aiding visual inspection.

(4) It is possible to make up assemblies having a large number of joints that can be heated at the same time.

(5) The workman can devote his entire attention to applying the heat to the joint, the danger of overheating being minimized because the alloy melts when the proper temperature is reached.

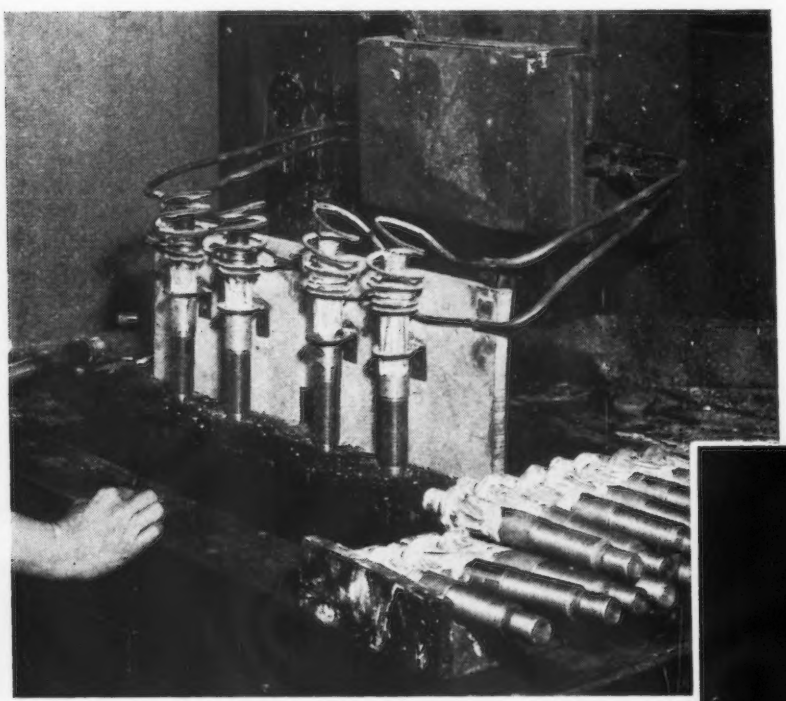
(6) The operations of applying the alloy and heating the joint are so divided that they can be incorporated easily in straight line, high speed production.

There are other factors to be considered in the preparation of a silver brazed joint, such as cleaning, fluxing, assembling and jigging, heating and subsequent cleaning of the joint. Each of these factors is equally important in making a good joint. However, the discussion to follow on the actual preparation of the joint will be confined to heating only and, in particular, induction heating.

Assuming that a suitable source for producing high frequency electrical energy is available, it then becomes necessary to design a conductor arrangement which will give the proper heat producing magnetic field, confined to the joint area, of the parts to be brazed. The customary form of these conductors is a coil, usually hollow copper tubing, to permit circulation of water for cooling, either single or multiturn, depending on the magnetic field requirements desired for the particular application. Since field strength depends upon the current in a single conductor, its magnitude can be amplified by the use of a multiturn coil, each turn acting as an individual conductor.

The important rule to remember with induction brazing is that in making a good brazed joint, one having high strength and leak tightness, it is necessary that all surfaces to which the alloy is to adhere must be heated above the flow point of the alloy. In a sleeve type of joint it is possible to heat one surface, causing the alloy to overflow and adhere to it, but not to the adjacent surfaces because being cold, they chill the alloy and thus prevent wetting. Therefore, the inductive coil should be so designed as to heat the joint area of all parts as evenly and uniformly as possible.

This must not be interpreted as meaning it is not possible to conduct the heat from an outer member to



LEFT

FIG. 3—Quadruple setup of multiturn coils for brazing a collar to a shaft.

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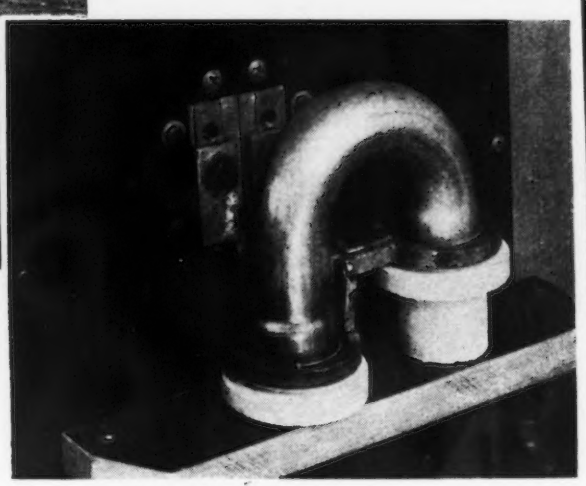
BELOW

FIG. 4—Threaded bronze collars are attached to each end of a copper drain elbow by the use of two single-turn coils.



an inner member. In a joint where there is a large shear area, such as a heavy collar on a thin tube, the heat can be concentrated in the outer member and the thin tube heated by conduction. This demands a tight fit between the parts, as previously explained. The heating coil should be designed concentric with the work, causing the collar to be in a strong magnetic field and consequently be rapidly heated. The heat generated in this outer collar would then melt the preplaced brazing alloy ring and also heat the surface of the tube beneath the collar to the flow temperature of the alloy. With the correct heating pattern the alloy would flow down between the collar and the tube by capillarity, completely wetting both surfaces and forming a fillet on both top and bottom.

The coil should be spaced sufficiently far away from the outer surface of the collar to give a slow, soaking heat rather than a surface heat which would produce such a temperature gradient across the collar as to cause overheating of the outer surface before the inner surface has been brought up to brazing temperature. A great number of brazing operations fall into the general classification just described. That is, when one member is heated by induction and the other member by conduction from the former.

The heat generating induction coil used for brazing can be of various design, depending on the shape of the parts to be brazed, and the location of the joint. Coils can be rectangular, circular, or spiral for external heating. A flat or pancake coil is used for large flat areas. Special coils can be made for internal heating, but are less efficient than an external coil.

Generally speaking, when considering induction heating for a brazing application the following points should be carefully considered:

(1) Determine whether the heat should be concentrated in one piece and allowed to flow by conduction to adjacent members, or whether all pieces should be heated directly by induction.
(2) Design the coil so as to subject the section to be heated to a strong alternating magnetic field.
(3) Allow ample spacing between the heating coil and the work. This will permit the work to be placed into and removed from the coil with the least trouble, and at the same time prevent overheating of surfaces very near the coil.
(4) Design the coil so that most energy is thrown into the piece of largest heat mass, thus allowing all parts to rise in temperature at the same rate.
(5) Strive for the simplest heating coil that will give the correct results.

There are many distinct advantages to the use of induction heating for silver brazing, both from the viewpoint of a practical heating method as well as permitting successful use of the silver alloy.

Together they are a natural team, with the advantages that the operations are extremely simple, making it possible to use unskilled operators. It is of decided advantage to have push-button control, particularly when a great many pieces are being produced. In addition, each joint is uniform whether one hundred or one million are made.

While the metal silver is relatively expensive and represents a definite percentage in the various silver brazing alloys, it has been proved that the actual cost of making a silver brazed joint is very low. The primary reason for this is the fact that so little quantity of alloy is needed to make a satisfactory joint. Furthermore, the alloy cost alone is not the only factor to consider in making a joint. The other operations, such as cleaning after brazing, speed of operation and reliability are factors definitely favoring the low temperature silver brazing alloys. The cost of operating the induction generator is very low, usually running in the neighborhood of ½¢ or less per piece heated.

Brazing by high frequency electric induction is inherently a fast operation, particularly when using the low temperature, fast flowing silver brazing alloys. For large scale production this is of definite advantage. The heating of parts can be confined precisely to the joint area. That is, of course, a factor in the low cost and high speed of operation but, in addition, there is very little oxidation, which means little or no cleaning of parts. Also, there is minimum annealing, a very important factor when high strength is a major consideration. Distortion which sometimes develops with other methods of heating can be reduced or entirely eliminated by induction heating.

Fluidity of Converter and Electric Steels

THE relationship between temperature and fluidity of converter and electric furnace steels was discussed at the first technical convention of the British Steel Founder's Assn. held recently at Sheffield, England, according to the Iron & Coal Trades Review. One of the conclusions reached was that temperature rather than steelmaking was the deciding factor in fluidity. Support for this statement was found in a report describing the use of a spiral to which was attached a pouring basin, making it suitable for bottom poured ladles. Where a greater degree of fluidity had been observed in converter steel, it was generally attributed to a higher temperature. Temperature measurements had led to the conclusion that converter steel was regularly poured 35° to 55°F hotter than basic electric steel. On the other hand, if a difference of fluidity did exist at the same temperature, it was suggested that the action of the boil might be the cause. It is well known and generally accepted that the time and intensity of boiling in the electric arc furnace largely govern the fluidity of the steel. It was reasonable to consider the increased speed of the reaction in the converter, apart from any temperature difference between the two processes, as giving rise to greater fluidity. Heat generated by chemical reaction within the mass was thought to be more effective in promoting fluidity than heat imparted physically. There was general support for the observation that reasonably good fluidity is assured from converter steel under any conditions, but careful control is essential if good fluidity is to be obtained from basic electric steel.

Speakers referred to most of the factors which play a part in fluidity. The influence of viscosity and surface tension on fluidity were given some consideration. While the effect of increase of temperature on these physical properties would reduce viscosity, surface tension might increase due to the formation of oxide films. The mechanism of freezing was also considered. The rate of growth on the walls of the mold and the effect of the creaminess set up by the rapid formation of a large number of nuclei which were in low carbon steels, were factors of considerable importance.

New Binders Improve Co

By H. L. GEBHARDT
President, United Oil Mfg. Co., Erie, Pa.

Practical advantages accruing from the use of synthetic resin core sand binders are described in this article. Among the characteristics imparted to cores by the recently perfected binders covered in this article are faster baking, lower baking temperatures, faster collapsing, favorable tensile and compression strength, hard, dense surfaces and softer centers and moisture resistance in the cured condition. Behavior of these binders under dielectric heat is also discussed.

FOUNDRIES are continually being called upon to produce castings of more intricate design, with metal thickness, dimensional tolerance and surface texture being required to meet even more exacting standards. In this race for better castings the core maker is often called on to set the pace. Improved castings usually call for new techniques in the core room. This search for new and better techniques has led to the use of a new bonding agent for core sand—synthetic resins. These newer core binders were needed to give faster baking and to provide faster collapse of a core on pouring. Thin walled castings needed extra protection against hot cracks and a smoother metal surface next to the core was also in constant demand.

Synthetic resin core binders are the newest type of bonding agents to be adapted to foundry use. They are completely distinct from drying oils in their behavior and derive their value for core work through reactions new in foundry practice. These synthetic resins are cured with oven heat and oxygen is not needed to set the bond. Baking temperatures average 100°F lower than that required by drying oils, and baking time averages a fourth to a half faster. These new binders are water soluble and hard-surfaced cores result from migration. In a cured state these bonds are moisture resistant and once formed, the bond is tough and hard but burns out fast in contact with molten metal.

FIG. 1—Hardness tests illustrating the hard surface and softer center of cores made with water soluble synthetic resin binder.

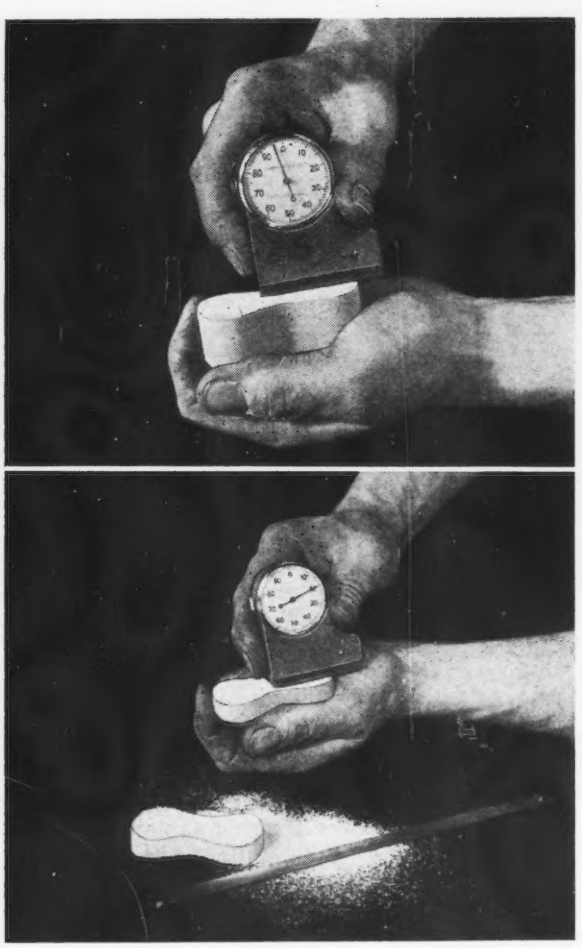


FIG. 2—One of the first attempts to produce a core using synthetic resin binders and dielectric heat. This core is 6-in. square and 1½-in. high, and was cured in less than 100 sec.

Synthetic resin core binders can be baked to a cured condition in ovens that range from 250° to 350°F, and the baking cycle will be complete as soon as the core has been dried of moisture. Also, being water soluble, the binder tends to migrate toward the surface of the

Core Performance

SETTING cores made with synthetic resin binders. Photo courtesy Wellman Bronze & Aluminum Co.

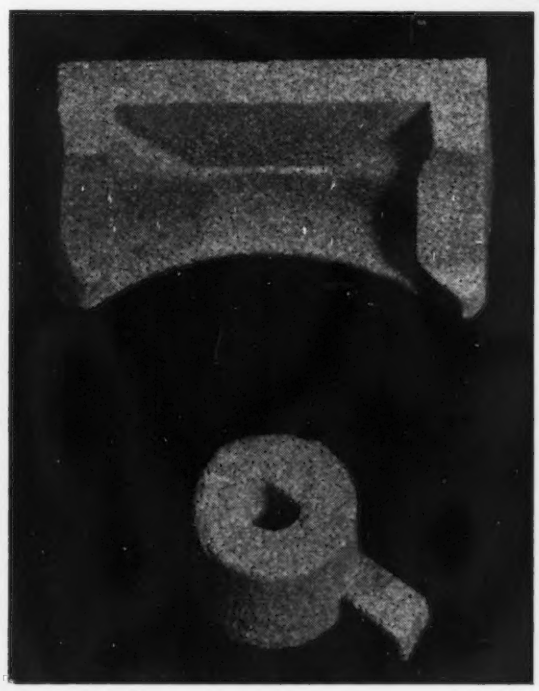


FIG. 3—Both these synthetic resin bonded cores were baked with dielectric heat. The larger core was cured in 90 sec, the smaller one in 75 sec. Proper adjustment of the electrodes made possible a complete bake in the small protrusion as well as in the heavier sections.

core as moisture is being driven out with oven heat. Finished cores can be processed in this way to a hard, dense surface and a softer center (see fig. 1), conditions favoring a fast collapse on pouring. These low baking temperatures and the time saved in baking, through not having to oxidize the bonds, were responsible for the earliest foundry tests.

The essential difference between natural and synthetic resins lies in the fact that natural resins are thermoplastic and synthetic resins are thermosetting. Natural resins as a group include gum rosin and wood rosin and exist in nature as the resinous portions of certain pine trees. These natural thermoplastic resins can be melted repeatedly with heating to a liquid condition and, on cooling, will revert to a natural solid and brittle state. Nature does not produce thermosetting resins; such resins are strictly artificial. Once the finished bond is formed, it cannot be remelted, but it can be destroyed with heat. Synthetic resins and the plastics industry are so closely associated that it is difficult to discuss one and not mention the other. Of the various types of plastics now being made, the urea-formaldehyde resins have proven to be most suitable for foundry service.

Synthetic resins are produced in a resin reaction kettle so designed as to provide controlled heat, agitation, and a condensing medium. The cooking operation can be carried on at atmosphere, under pressure, or in vacuum, as the need requires. An important part of the reaction involves careful control of the acid or alkaline condition of the mix and expert timing. When the process is complete, the resin in liquid form is drawn off. It will contain varying amounts of water but is a finished product for a variety of applications. Certain other applications require its use in dry or powdered form, particularly as molding compounds for the plastics industry. This change can be accomplished by spray drying the liquid resin. Both liquid and powdered resins are being used as bonding agents for cores—the liquids to emphasize migration and the powders to favor cross-sectional strength.

Any product is a suspect until the foundry has been sold on its performance. This was particularly true in the case of synthetic resin binders. The sand treated with these binders had a different feel, lacking lubrication that core oil afforded. At the mixer the smell was different, core boxes required cleaning in a slightly different manner, cores baked without changing color and a hot oven burned the binder. But application techniques developed rapidly, and synthetic resin core binders now have come to be depended upon where a fast bake and a fast collapsing core is important. Any attempt to appraise the value of these new binders for the core room would deal largely with a study of what happens at each step in the process of core making.

There are no types of core sand which must be avoided. Sands which respond well with oils will show

equally good performance with synthetics. If there is any difference, it lies in the fact that finer sands can be used with synthetics, ranging down to types which are classed as float sands. Reclaimed sand also has been bonded with these resins and used again in the core room.

When cereal binders are added to the sand mix, it is often good practice to choose them for water soluble traits. Certain Dextrins, rated by the manufacturer as 95 pct water soluble, will aid shell hardness by a tendency to migrate with the resin toward the core surface; other cereal binders, which class as heavy yellow flours and which are rated 9 to 11 pct water soluble, will definitely build up center strength. Either type can be used safely with cores which must be stored, for it is characteristic of synthetic resin core binders to cover the cereals and naturally afford moistureproofing to the same extent obtainable in a straight core oil. Cereal binders which naturally show good dry or baked strength are often used as extenders for synthetics since less binder will be required in the sand mix to obtain standard strength.

Properties of Cores

Core sand to which only synthetic binders and tempering water have been added will show about the same green strength as the same sand and oil, although some foundries find higher green strength in the use of synthetic resins. When cereals are added to stiffen the sand mix, heavy yellow flours have been preferred, and green compression values up to 2½ psi are regularly developed. Bentonite in extremely small amounts has been used. A distinctive difference in green compression was noticed by one foundry when synthetics were substituted for oil in a processed sand mix used for magnesium. This was a mix to which sulfur, boric acid and cereals had been added in regular proportions. With 1 pct of cereal binder in this particular mix, cores showed a green compression strength of 1 psi. If synthetic binders were used to replace the oil, it was observed that green compression strength showed a drop to 0.8 psi. But when synthetic binders were increased to develop high tensile strength in the cores (in the 200 lb class) then the mix with synthetics will develop double the green compression as compared to an oil bonded mix built up to the same tensile strength.

While core sand which has been mixed with synthetic resin core binders will not cure on standing without having heat applied, it will air dry and tend to crust over at the top as moisture is drawn out into the air. While this action accelerates at higher temperatures, foundries regularly using synthetics find that the prepared sand keeps in good working order for 12 hr at an average room temperature of 80°F. Crusted top sand can be pushed back into the heap and worked. Or, when sand is required to stand for any length of time, as in hoppers, it can be covered with wet bags.

Baking time for synthetic resin core binders will depend on the size of the cores and the amount of water used in the mix. The core will be baked a few minutes after it has been dried of moisture with oven heat. White sand will not change color except as it indicates an overbaked condition of the core. The fact that synthetic resin binders do not require a time cycle for oxidation has speeded baking to the point where it is being done one quarter to one half faster. Cores can be baked successfully at temperatures ranging from 250° to 400°F, with a range of 325° to 365°F generally favored. At temperatures close to 350°F, cores can overstay the natural baking periods and not be damaged with oven heat. At higher temperatures they will have to be removed from the oven as soon as the binder sets or cures. Temperatures above 400°F can be extremely critical when urea-formaldehyde resins are used and overtime in a 500°F oven will actually burn out the bonding resin and cause the core to collapse with oven heat. Phenol-formaldehyde resins show better heat resisting qualities, but do not collapse as freely in contact with hot metal and for that reason have not come into such general use as the urea-formaldehyde types.

The one distinguishing trait which forced synthetics to the front was its rapid response to heat in baking. This unique behavior suggested, first, the use of infrared rays as a heating medium, and cores of various sizes were baked under infrared lamps with very fast timing. Strainer cores can be brought to a cured condition in 15 min; tensile strength cores 1 in. thick are baked in 30 min; chunk type cores 7 in. high and weighing 13 lb will bake with a 75-min exposure in a light tunnel when four rows of lamps are used.

Infrared lamps have been used in the foundry as a medium for drying molds for a number of years. Now the same method of applying heat has been found adaptable to baking cores made with synthetic resin binders and a new avenue of relief afforded to core rooms whose oven capacity is desperately overcrowded.

The second urge to try synthetics for a really fast bake came with newer applications of dielectric or radio frequency heat. This type of heat, as distinct from heat transferred from an outside source, is generated in the object treated, permitting a core, for example, to develop the same temperature at the center as at the surface. This method of generating heat in materials which are normally nonconductors of electric current, as well as poor conductors of heat itself, will cure synthetic resin core binders at speeds new to the foundry industry. Cores are simply placed between the electrodes of a high frequency field and in a matter of seconds the job is done. One of the earliest applications of dielectric heat was in 1943 to cure synthetic resins used as the bonding agent for core sand. A core (fig. 2) 6 in. square at the base and 1½ in. high was heated between two electrodes and brought to a baked or cured condition in less than 100 sec. More recently a disc-shaped core of 3¾ in. in diam by 1¼ in. high and weighing 14½ oz was completely dried of its moisture content and the resin binder cured in 60 sec.

While cores which are flat top and bottom will bake out with the greatest economy of electrical energy when the top electrode is almost in contact with the core, it has been found more practical with irregularly shaped cores to space the top electrode a short distance above the highest points. This method will dissipate some of the current but will prevent overbaking the high spots and leaving the lower sections in an underdone condition. The larger of the cores illustrated in fig. 3 was baked in 90 sec, and an air space equal to the height of the core was maintained between the core and the top electrode. The smaller core, fig. 3, with an air space equal to its own height, was baked in 75 sec. The small protrusion at the base of this core took a finished bake the same as the higher section.

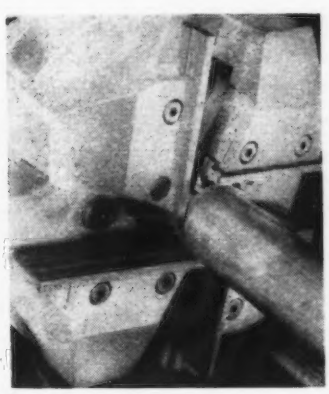
The cost of a transformer or generator for radio-frequency heat may appear high for the foundry budget, but the answer as to whether it will pay out depends on the value which can be assigned to a quick bake and a fast throughput.

New Equipment . . .

Small Tools

New models in machine tool fixtures, including drill press converters, grinding fixtures, automatic wrenches, vacuum grip lathes and optical centering tools are described in this week's review. Also milling cutters, rotary broaches, drills, tool holders and disk files are some of the small tools discussed.

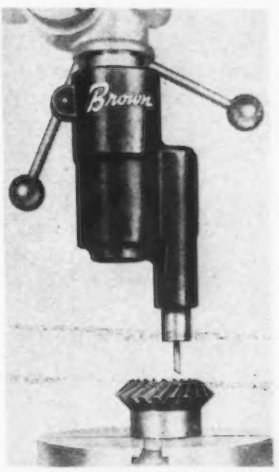
ANNOUNCEMENT of a centering throat chaser for work that must have threads concentric with the OD has been made by the *Landis Machine Co.*, Waynesboro, Pa. It is especially adapted to the threading of valve stems and other long length threads of coarse pitches, and can be used only when the OD of the work is held uniform, since the centering throat section of the chaser takes a bearing on the OD. The chasers are flexible in that any difference on the OD can be corrected on the centering throat to maintain proper pitch diameter. In addition to holding concentricity between the thread and OD of the work, the chaser is said to eliminate an out of round condition that often exists when long work pieces are threaded. The centering throat



takes a bearing as soon as the chaser contacts the work and is said to assure accurate and well formed threads from the start.

Drill Press Converter

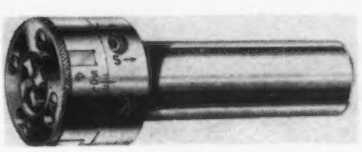
ANY size or make drill press can be converted to perform filing, cutting, sawing or slotting operations, it is said, through use of a unit manufactured by *Leo G. Brown Engineering Co.*, 1157 Riverside Drive, Los Angeles. It can be attached in 3 min and there are only three moving parts. Mounted between two preloaded ball bearings is a solid steel cam which converts the drill press rotary action to a



vertical reciprocating action and increases the drill press power output. The main housing is a Durometal casting with bronze sleeve insert for bearing surface. The unit is available in 1 and 1¾ in. stroke models.

Die Head

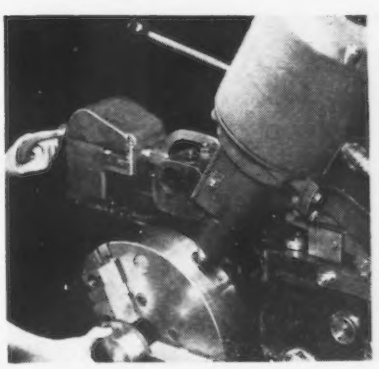
IMPROVEMENTS of style EJ5 die head manufactured by the *Geometric Tool Co.*, New Haven 15, are said to have simplified construction and made it lighter in weight. Steel retaining rings have been sub-



stituted for the two cam retaining keys and two screws originally used. The improved tool can be applied equally well to Swiss type automatics, such as Gorton, Petermann, Ceco, Wickman and others. In the new type the rigid shank fits over the spindle and is driven by a cross pin held in position on both sides by the steel retaining ring. Another retaining ring holds the head together. The new tool has a shorter shank, smaller OD, shorter overall length and weighs only 2 oz. Style EJ5 equipped as standard with the forward floating shank can be applied directly to the turret of the No. 00 and 00G Brown & Sharpe Automatic without the use of special holders. The die head is also made with a rigid shank, or threaded back part.

Automatic Wrench

DESIGNED to reduce chucking time and eliminate worker fatigue, a motor-driven power



wrench has been announced by the *Fen Machine Co.*, 1307 Babbitt Rd., Cleveland. The wrench consists of an electric motor driving a wrench head adapted to the particular chuck being used. The wrench head is introduced into the socket, rotated and withdrawn by means of a hand control. The wrench does not have to be set for any specific operation and is not restricted in action but will move the chuck jaws to the full extent of their travel. Tension of the chuck jaws is regulated by a control lever. The wrench

which is mounted at the back of the machine is readily adapted, it is said, to any type or size of machine and to any chucking, gripping or clamping operation.

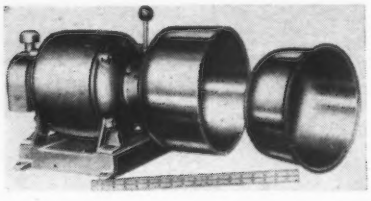
Grinding Fixture

ADAPTED to grinding cutting edges, steps, flutes and chip relief on milling cutters, burring tools, counterbores, countersinks, end mills, reamers, drills and taps, an axial relief grinding fixture has

been announced by the *Govro-Nelson Co.*, 1931 Antoinette, Detroit 8. It is said to perform operations which formerly required a variety of different grinding fixtures. All adjustments are simple, visual and external, the fixture being instantly convertible from right to left hand, and vice versa. It can be used on surface grinders as well as cutter grinders, and performs most of the grinding jobs with standard grinding wheels. The axial relief is automatically equalized on all flutes.

Vacuum Grip Lathe

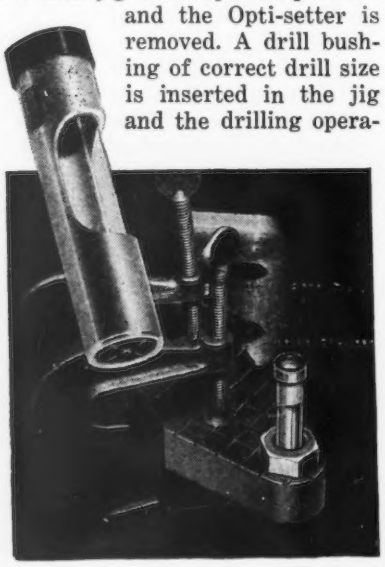
INTRODUCING a built-in wet vacuum pump which holds work pieces without chuck or collet, a heavy duty, vacuum grip speed lathe which holds work pieces without chuck or collet, has been announced by the *Crozier Machine*



Tool Co., 654 North Prairie Ave., Hawthorne, Calif. Without the use of piping or glands, the built-in pump generates its own vacuum that holds the work securely when the lathe is in motion and releases the work when the machine is stopped. Starting and stopping of the spindle are accomplished through mechanical brake and switch, that is controlled by a single lever. Adaptable to both small or large work pieces, the vacuum grip lathe holds metal, plastic, rubber, wood or glass.

Optical Centering Tool

FOR use wherever drilling operations are performed, the Opti-setter, a small, low cost optical centering tool has been announced by the *Benton Co.*, 351 South La Brea Ave., Los Angeles 36. The tool, which is vest pocket size, is said to accurately locate templates in proper relation to workpieces, to center drill jigs to reference marks or to layouts, and to measure between points, work edges or reference lines in special setups. On drilling operations the Opti-setter is inserted in a drill jig, which is adjusted until the crosslines in the Opti-setter coincide with any desired layout mark on the workpiece. The drill jig is clamped in position and the Opti-setter is removed. A drill bushing of correct drill size is inserted in the jig and the drilling operation is then completed. Locating accuracy is equal to the layout whether holes are machine drilled or performed with a portable hand drill. The Opti-setter is available in two sizes: ½ in. diam x 3 in. long and ¾-in. diam x 3 in. long.



Lead Comparators

LEAD comparators for use in gear production shops have been introduced by *Michigan Tool Co.*, 7171 E. McNichols Rd., Detroit. Known as models 1200 and 1200A, the machines may be used as an aid in setting up gear cutting and finishing machines, to check gears after processing, to determine lead compensation for unwinding of gears during heat treating, etc. They are applicable to both external and internal gears as well as worms. Model 1200 will check helices up to 45° at several points, 1200-A may be used for larger helices and to check the leads of worms. Both comparators will

handle work with a maximum swing of 10 in. The two indicators and indicator contact point, are within the operator's vision. Both indicators have a common pivoted contact point, with suffcient clearance between the two indicators so that only one indicator operates at a time.

Collet Fixture

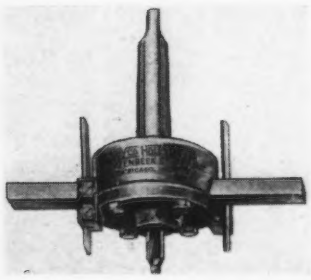
USED to grind parts without centers, which can be held in collets, a collet fixture which runs on its own ball bearings and is driven by the headstock of the machine has been introduced by the *Zagar Tool, Inc.*, 23880 Lakeland Blvd., Cleveland 17. The collet can be opened or closed while the grinder is running. Because the collet

does not move lengthwise, it is possible to hold overall dimensions, it is said. The tool can be adapted to any make or model of grinder.

Hole Cutters

SAID to cut clean round holes or washers from steel plate, or any other materials up to ½-in. thick-

ness, a heavy duty hole and washer cutter for production work has been produced by *Wyzenbeek & Staff, Inc.*, 838 West Hubbard St., Chicago 22. Balanced cut is insured by two standard high speed cutoff blades. Shanks are interchangeable. The tool is furnished with



⅞-in. hexagon shank to fit any 1-in. drill chuck, or with No. 3 or 4 Morse taper shanks. The company also makes a hole cutter for electric drill, drill press, or carpenter's brace. It fits any ½-in. drill chuck, is adjustable and self-tightening. This tool is for cutting round holes in sheet metal, Bakelite, fiber, and other materials.

Carbide Cutters

AN inserted tooth carbide cutter, with blades interchangeable for any type of milling job, has been introduced by the *Wendt-Sonis Co.*,

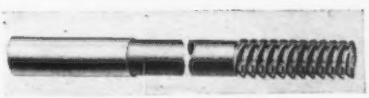
Hannibal, Mo. The cutter, said to require less power than ordinary cutters, is adaptable to standard machinery. A special type wedge prevents blades from slipping out while in operation, and the blades may be removed and ground on an ordinary bench grinder.

Break-Proof Drill

DEVELOPMENT of a break-proof drill, said to cut through the hardest and softest metals with equal facility, has been announced by the *Enesay Tool Co.*, 2240 Sepulveda Blvd., Los Angeles 23. The tool frequently eliminates the need for internal grinding, since it is designed for precision drilling and reaming to extremely close tolerances. The salvage of costly steel parts after hardening, if errors or design changes have been made, are also made possible, it is claimed. The metallurgical properties of the surrounding metal are not affected in the drilling; only the metal removed during drilling is softened.

Rotary Broaches

INTRODUCING a technique called rotary broaching, because the tool is a broach that rotates as it cuts, a shearcutter rotary broach has been produced by the *Fearless Tool Co.*, 1234 So. Gramercy Place, Los Angeles 6. The tool is made with high spiral or helical cutting edges, which, when pressure is applied, removes metal by molecular cleavage in a shearcutting, knife-like manner. The chips removed resemble steel wool in both form and texture. The cutting edge of the rotary broach forms a circle,



and consequently produces perfectly finished holes, it is said, which eliminate the necessity of other operations such as broaching or grinding to produce perfect holes. Rotary broaches can be reground 10 to 30 times before the diameter is reduced, it is claimed. They are available with straight shanks, in sizes from ¼ to 1 in. by one-sixteenths and from 1⅛ to 1½ in. by eighths.

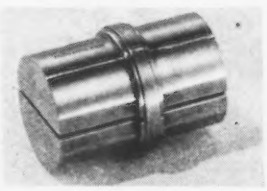
Grooving Tool Blades

SOLID Kennametal grooving-tool blades that are said to permit more regrinds than tools having brazed-on tips, have been produced by *Kennametal Inc.*, Latrobe, Pa.

Their rigidity is claimed to minimize weaving which causes rapid tool wear on grooving jobs. The blades are available in standard sizes, including ½ in. high x 2½ in. long, and ¾ in. high x 4 in. long. They are supplied with 10° angle formed on one end, 2° clearance angles on each side, and in widths made to users' specifications, ±0.0005 in.

Expanding Arbor

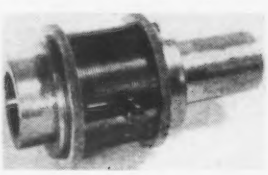
CALLED the Auto-Arb, an expanding arbor for use on secondary operations where workpiece is held by the ID has been announced by the *Asco Corp.*, 874 E. 140th St., Cleveland. Its design permits chucking and unchucking the workpiece without stopping the spindle when used on a screw machine or lathe with standard collet.



It expands to maintain perfect concentricity with the collet, it is said, and no other tools are required for chucking the workpiece. It is made in sizes from ⅜ to 1 in., at 1/64th intervals. The entire range is accommodated with three collet sizes.

Floating Tool Holder

ADAPTABLE to drill presses, Bullard, P.&J., Acme-Gridley, New Britain and Conomatic Automatics, as well as most types of hand operated screw machines, a full-floating holder has been designed by the *Mosley Mfg. & Sales*



Co., Syracuse 3, to meet requirements and specifications in threading operations. The tool, said to minimize many of the causes of threading problems, operates on all types of material, from the toughest steel to aluminum or hard rubber, corrects misalignments, permits faster spindle speeds while threading and re-running of threads as many times as necessary in order to obtain size and depth. When the threading stroke is completed, the diehead automatically returns to starting position. The tool is designed to provide a positive start and stop.

Turret Diamond Holder

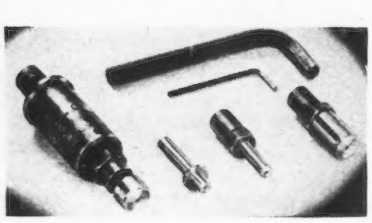
WHEN used either in the adapter of a center grinder or in conjunction with a magnetic block on a surface grinder, an automatic selfcentering, turret diamond

holder manufactured by the *Diamond Tool Co.*, 938 East 41st St., Chicago 15, is said to get the utmost in use from a diamond by using a range of three different degree angles, 30, 20 and 10°, each to its complete extent by rotation of the diamond nib successively in the 30, 20 and 10° angle holes. The mechanical action of this turret holder automatically centers the diamond point in each of the three varied angles directly at the point of grind on the grinding wheel. This accessory is said to double the life of diamonds, lessen consumption of

wheels, improve the accuracy of the grind and avoid destruction of diamonds by wheels becoming out of round. The tool is for use only with the company's Re-Set-Able diamond tools.

Lathe Collet Stop

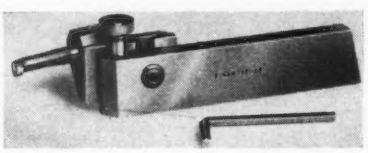
FOR second operation work, *Hardinge Bros., Inc.*, Elmira, N. Y., has announced a universal lathe collet stop which will convert any standard 1-in. capacity lathe collet into a solid stop or spring ejector stop collet without alteration of the standard collet. The application of the stop to a standard collet does not require machining of the collet, as it is placed in the rear of the collet and anchored in place by a single locking bolt. The stop with spring ejector in place will



automatically eject parts from a collet when the collet is open. A collet stop set consists of the collet stop body, one large and one small solid stop insert, one large and one small spring ejector insert and wrenches.

Tool Holder

PROVIDING vertical adjustment for boring tools in lathes, a holder has been designed by *Bokum Tool Co.*, 14775 Windermere Ave., Detroit. A simple turning of a knurled screw moves the tool in a vertical parallel plane to bring it to any position setting. The adjust-



ment can be made quickly, it is said, dispensing with use of shims, and can be positively locked. The holder, made of alloy steel, is offered in two sizes: BT-1 with ½ x 1 ¼-in. shank and BT-O with ⅜ x 1-in. shank.

Carbide Drills

A LINE of solid carbide drills has been announced by *Willey's Carbide Tool Co.*, 1340 W. Vernor Highway, Detroit 1. The drills, of solid Willey's Metal, are said to give high efficiency and lower production costs in drilling cast iron, brass, bronze, magnesium alloys, aluminum and nonmetallic materials. Diameters range from 1/16 to ½ in., and lengths from 2½ to 6 in.

Carbide Tool Bit

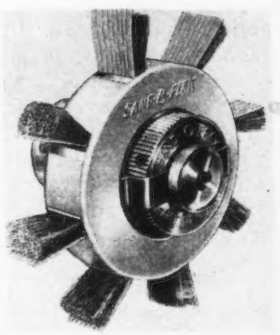
CONSISTING of a holder, supplied in standard sizes, and an insert bit of solid carbide which is held in place mechanically, a tool bit has been announced by the *Super Tool Co.*, Detroit 13. The insert carbide bits are large, providing a heavy cross section of carbide which is said to insure ability to take deep cuts and heavy feeds. Bits can be ejected for regrinding. Holders are universal, only the grades of carbides and the grind on the insert bits need to be varied.

Disk File

FOR use on light alloys, diecastings, and plastics, *Kennametal Inc.*, Latrobe, Pa., has produced a disk file, designed to facilitate the facing of rough castings, and removing of unwanted projections, such as flash or draft, gates, risers, etc. It consists of double-cut segments of solid Kennametal, dovetail-wedged into a 12-in. diam steel body which can be supported and driven by any suitable means. The teeth are formed and positioned so that the material is sheared off in cleancut chips, it is said. The file body may be attached direct to a rotating member of the driving machine, by socket head cap screws, if it has a suitable supporting flange and centering stud.

Sanding Wheel

IDENTIFIED as Model 350-B, a brush-backed sanding wheel has been announced by the *Sand-O-Flex Corp.*, 4373 Melrose Ave., Los Angeles 27, which is a duplicate of the Model 550-A but has a smaller diameter of 3⅝ in., and overall diam of 5½ in. including brushes, and weighs 1⅞ lb. Eight replaceable brushes cushion the abrasive strip



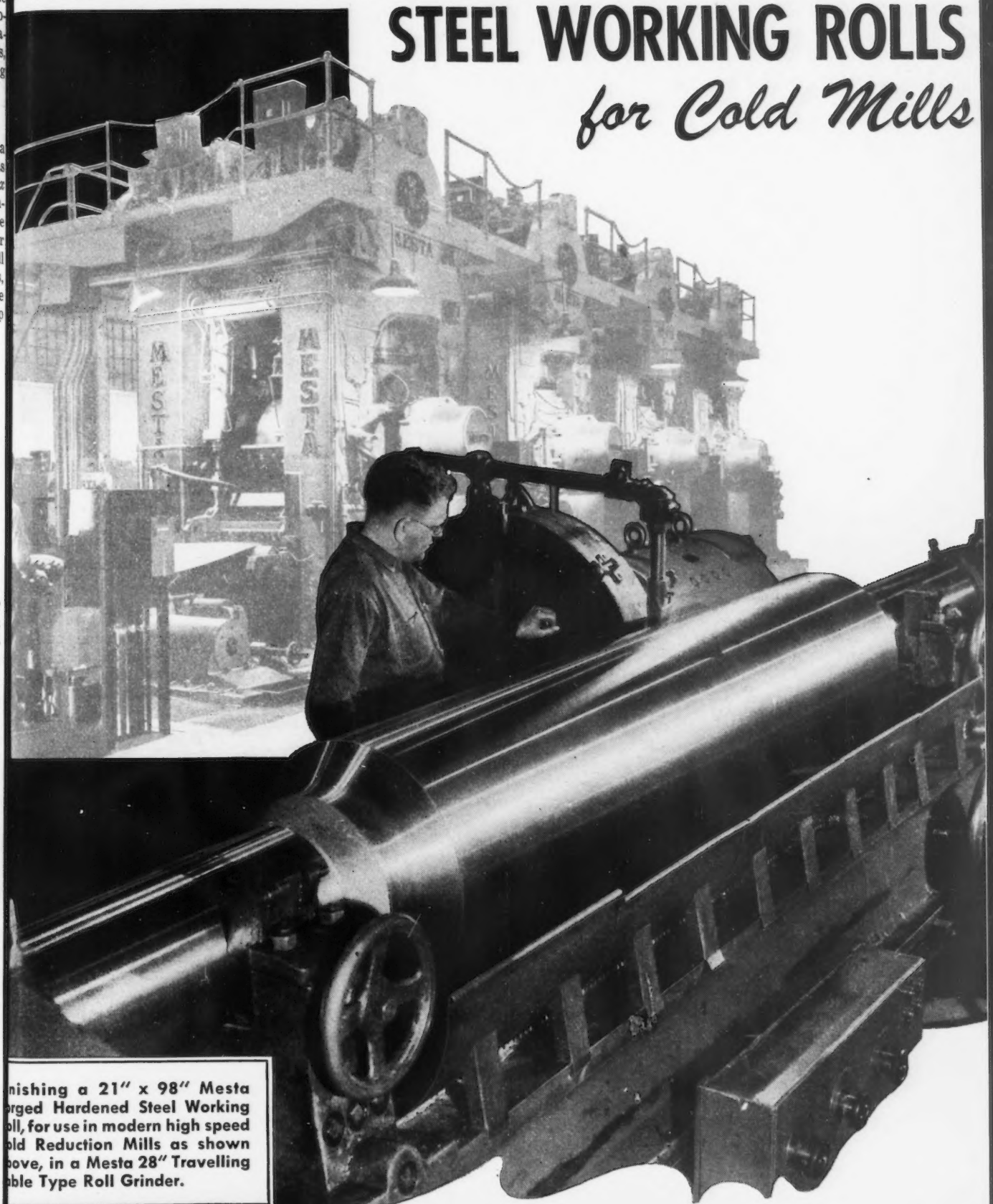
allowing the flexibility necessary for finishing irregular surfaces. This wheel can be used on any electric motor shaft; a 1/6 hp motor or an electric hand drill is adequate. Recommended speed ranges from 400 to 1750 rpm. It fits ½ and ⅝-in. shafts and has adapters for threaded spindles for any size.

Micrometer

AN outside micrometer tipped with wear resistant sapphire has been placed on the market by the *Sapphire Products Div., Elgin National Watch Co.*, Elgin, Ill. This micrometer, anvil and spindle of which are tipped with sapphire, is available in 1 to 6-in. sizes, English

and metric styles. Accuracy is guaranteed within 0.0001 in. The instrument features adjustable spindle bushing; hollow, lightweight frame, tool steel ground spindle thread, positive lock nut, and 0.0001-in. graduations.

MESTA FORGED HARDENED STEEL WORKING ROLLS *for Cold Mills*



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oll, for use in modern high speed
old Reduction Mills as shown
bove, in a Mesta 28" Travelling
able Type Roll Grinder.

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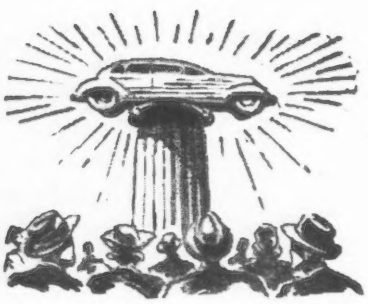
Assembly Line . . .

WALTER G. PATTON

• Statistical barrage to accompany wage negotiations in auto industry . . . Nathan report declared unsound economics . . . Auto labor and management at crossroads.



DETROIT—Whether the Nathan report is properly pegged as a collection of "phony figures," a brief worked up to support a client, zany economics or as a sincere effort to determine the economic facts of life, it adds up to one conclusion as far as the automobile industry is concerned—higher prices for cars and in all probability costly strikes in the automobile and other industries during 1947.

With the support of the Nathan study the UAW-CIO is preparing to ask the automobile industry for a flat 23½¢ per hr increase or 17½ pct. The UAW will also ask employers to contribute to welfare funds and what it calls "pay inequity funds" which, if granted, may bring the overall demands to 30¢ an hr or a 25 pct increase—precisely the amount Nathan believes the industry as a whole can up wages without raising prices.

Within a very few months, prospective car buyers may be lacking new cars, but they will hardly be lacking statistics purporting to show that all industry, not excluding the auto industry, is indeed guilty of fattening itself at the expense of its workers. The possible pattern of this statistical barrage has been described by Frank Rising, of the Automotive & Aviation Parts Manufacturers. According to Mr. Rising, the propaganda pattern will include a generalized statement drawn up in such a fashion as to emphasize a large sum of dollars. High profits will be assumed to be universal. The effect of inflation of the union members' wages will be stressed, but little consideration will be given for the fact that the income of the investor has also been adversely affected.

ALTHOUGH the automobile industry has produced sworn statements showing that it lost $135 million in its operations during the first three quarters of 1946, there is little hope that auto producers will receive consideration as a nonparticipant in the alleged lush profits of the U. S. manufacturers. From the union point of view all this deficit was wiped out by equally lush tax carrybacks that reduced the net industry loss to $5,490,000. The tax carrybacks, incidentally, will not apply to 1947 operations. According to the union a higher level of operations and higher prices will easily take care of the deficit in 1947.

"General Motors," according to Walter Reuther, president of UAW-CIO, "can increase its wages, reduce its prices and still make a net profit of $600 million next year if 1941 production value is attained."

General Motors incidentally reports that during the first 9 months of 1946 it earned a net profit of $14,012,000; its net profit in 1941 was $201,652,000. According to C. E. Wilson, president, last year's strike cost the corporation $100 million.

Other facts that may be pertinent to the present discussions, particularly in view of Reuther's anticipated GM profits for 1947, are that the prices GM and other producers are paying for materials and supplies are advancing rapidly and the end is not yet in sight.

According to automobile manufacturers, since OPA expired something like this has happened to prices; steel prices have advanced from 2 to 10½ pct; gray iron castings from 8 to 37 pct; crankshafts 12 pct; fans, motors and relays 10 to 30 pct; copper wire 27 pct; brass rods 20 pct.

C. E. Wilson's recent assertion that automobile prices would have to rise 25 pct to accommodate a wage jump of the same amount, has been flatly denied by Reuther. Commenting on the Nathan report, Reuther had called attention to the fact that wages constitute only about 25 pct of an automobile producer's costs, hence it is nonsense to talk about raising prices 25 pct if wages go up by that amount.

THE Wilson argument, of course, required detailed explanation. It takes in a great deal more territory than Reuther's argument and has the further advantage of having been demonstrated in the past.

The Wilson contention is that when you buy a motor car you are paying roughly 85 pct for labor and 15 pct for all other charges. For example, when you purchase a fender for your car, you first must pay a labor charge for mining the ore and transporting it. More labor costs are added at the steel mill to convert the ore to steel and to process the steel into finished form. Additional labor must be added for transporting the steel from the mill to the auto plant where the auto producer's labor cost begins.

The GM argument contends that in the final analysis—after eliminating all duplicate charges—labor costs add up to about 85 pct of the finished price while depreciation, taxes, insurance, interest, dividends and other fixed charges together with the small cost of the original raw material accounts for the balance.

George T. Christopher has recently set the intrinsic value of materials in a motor car at $24; the rest of the cost, he asserts, is labor.

This is the reason, say the proponents of this argument, why prices have always gone up—and will continue to go up in direct proportion to labor costs.

One argument that is being advanced to show the fallacious reasoning in the Nathan report is that in the Nathan study no consideration whatsoever is given to the in-

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vestment that is necessary to produce the alleged lush profits of manufacturers. According to automobile economists, total profit figures are absolutely meaningless except in relation to the capital that is used to produce such earnings.

WHILE no exact figures are available at the moment, it is known that available horsepower behind each worker (a rough indication of investment) increased from 3.4 in 1929 to 5.6 in 1939. Actual dollar investment behind each auto worker was recently calculated to be approximately $6000.

It has been argued that many of Nathan's comparisons are of doubtful accuracy if not deliberately misleading. For example, when capital gains are compared the base used is invariably 1937-39 which were relatively unprofitable years for the automobile industry. However, when workers' weekly incomes are compared the comparison is taken at wartime peak, usually with overtime work included.

No consideration is given whatever, say Nathan's critics, to the fact that the automobile industry is today employing more people and paying them higher monthly wages than at any time in its history. By keeping these people on the payrolls the industry is doing in effect, according to its defenders, what labor has always wanted it to do in the past—spreading the work in bad times. Labor advocates such a policy one spokesman asserted this week, but under present conditions the industry is being penalized for keeping workers on its payrolls.

Another fallacy in the Nathan arguments according to the auto industry is the fact that the report apparently completely ignores the ultimate results of applying, say a 25 pct yardstick to any entire industry. Assuming for example, that the soy bean industry does have earnings that would permit a 25 pct overall increase in wages, to attempt any such flat wage levy on the industry as a whole would immediately drive out the industry's marginal producers. Following this, subsidies would be required to keep the marginal plants in operation. Eventually the industry would be back in the familiar pattern of subsidies and shortages.

STILL another argument that can be brought against the Nathan study is that it bases most of its conclusions on the ground that take-home pay has not gone up in proportion to the cost of living. The cost of living, argues a spokesman for the auto industry, is determined in the final analysis by the farmers who may sell or withhold at will their produce from the market. Only recently farmers have proved themselves to be the most difficult group in the country to control pricewise and marketwise. According to Nathan's own statistics, the prices paid to farmers have gone up from 100 in 1939 to 278.4 in October 1946. During the same period, the consumer price index has gone up from 100.00 to 149.3.

Other critics have pointed out that any wage increase to a small pressure group can amount at best to a temporary advantage in favor of this particular group; that any wage increase that is to be effective in raising standards of living must be accompanied by a similar increase in productivity per man-hr. and that profits earned but plowed back into the company are one of the best forms of security the worker can possibly have. The best example of this, of course, is the Ford Motor Co., where 123,000 workers are today earning a good living primarily because profits earned in the past have been reinvested in the business. Without such a profit margin to make the fat years carry the lean, it is argued Ford would have been out of business many years ago.

Whether arguments of this kind will finally prevail against the highly emotionalized demands of UAW-CIO labor leaders in the months ahead is difficult to determine. What is fairly certain, however, is that lines have been drawn between the auto industry and the UAW-CIO for wage negotiations which promise to be the most important ever held between the two parties. As one prominent columnist observed last week, neither the industry nor labor can afford to make the wrong decision this time.

ROCKET RIGGERS: *Eric Kashig (foreground, left) who worked in Germany on the deadly V-2 rocket, now being utilized for upper atmosphere research at White Sands, N. M., consults with Barney B. Halbert of Dallas, technician for the General Electric Co., which supervises assembly and firing of the rockets. Preparation for launching of the missile is expedited by the new gantry crane shown here.*

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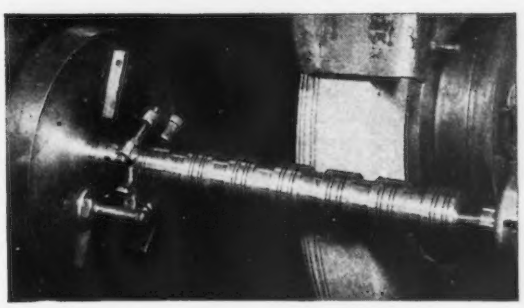
8. Resistance to rancidity
9. Rust preventing properties
10. Long coolant life
11. Keeps supply lines clean



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8. Quick settling out action
9. Keeps supply lines clean
10. High dilution ratio
11. Economical

Washington . . .

L. W. MOFFETT

• Reciprocal tariff agreements develop growing hostility by industry . . . CEA says depression can be avoided if government, management and labor use good judgment.

WASHINGTON— Sacrosanct though it is to the State Dept., its reciprocal tariff agreement program is again being blasted as an unholy thing by some industries. As the Department zealously promotes the program in preparation for January hearings on new agreements with 18 nations, it is being made the target for increasing criticism. There is a general feeling that while industries are free to make presentations at hearings in opposition to tariff cuts or further tariff reductions, as the case may be, no heed will be given to protests.

It is insisted that the program for slashes in duties will have been determined upon in advance and that they will be made despite any objections that are raised against them. The State Dept. has vigorously declared that such charges are unwarranted and insisted that careful consideration will be given to protests against tariff reductions.

Nevertheless, a common view shared by industries that are opposed to tariff cuts, was stated recently by Charles W. Holman, Secretary of the National Cooperative Milk Producers' Federation.

He told Metropolitan Cooperative Milk Producers Bargaining Agency at a meeting in Syracuse N. Y., that the hearing on Jan. 13 will be "a mere window-dressing approval of another round of tariff cuts that already will have been negotiated." He added that "there is no hope outside of Congress for averting grave injury to dairy farmers and livestock producers."

Mr. Holman's remarks gave rise to renewed reports that farm groups, together with industrial groups, may go to the new Republican Congress either to repeal the Reciprocal Tariff Agreement Act or to give to the Senate authority to approve or disapprove a tariff agreement, a power that it does not now have.

THE existing trade agreement law was branded by Mr. Holman as "a cross upon which American agriculture will be stretched and nailed," causing damage to American farmers and industrial labor alike.

Only three groups, Mr. Holman said, can benefit from the proposed trade agreement:

(1) International manufacturers with plants located in foreign lands as well as in the United States.

(2) International bankers who finance the international manufacturers.

(3) Foreign countries, some of which have borrowed from the United States immense sums with dubious intentions to repay.

"Manufacturers for domestic consumption will lose markets. Wage workers in those plants will lose jobs. Dairy farmers and livestock producers will lose a decent standard of living, because no program of private or public price stabilization can be maintained in this country without at least a moderate tariff law."

This threat against the Reciprocal Trade Agreement Act has come on the heels of the report of the Preparatory Committee of the International Conference on Trade and Employment unanimously approved recently in London by delegates from 18 nations.

This report is in the nature of a charter for a proposed international trade organization and principles governing it to be merged into the United Nations Economic and Social Council. This meeting, initiated by the State Dept., is to be followed by another and far-reaching one of the same nations next spring in London. It will discuss tariff reductions, elimination of preferential tariffs, international cartels, blocked currencies and many other matters relating to international trade.

SOME of the practices to be discussed are so deeply embedded in the policies of the affected nations that it is expected that the meeting will be extremely lively at times and will not achieve in full its purposes.

Moreover, agreements on reduction of American tariffs, at least some of them, will meet with hostility in the new Congress. This is clear from the fact that most Republicans in the Senate and the House voted in 1945 against extension of the Reciprocal Tariff Act. It was passed by a Democratic majority and extended to June 30, 1948. Its renewal by a Republican Congress is improbable, though if the next President is a Republican, he might ask for extension of the act on the principle that it can be used to raise as well as lower rates.

Broadly, Republican thinking does not accept the doctrine that simply because of America's comparatively new economic position as a creditor nation it alters the fact that it cannot maintain high wage standards and greater costs and compete with imports produced by cheap labor and low costs. Supporting this policy in the past was organized labor. But the CIO appears to have swung to

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a policy of low tariffs, urging that the change in international economic conditions make such a policy necessary in order that nations must export in order to buy and pay their debts. Some of these nations which make the same argument maintain trade barriers such as preferential tariffs that fly in the face of their own contentions.

Actually normal international trade now beginning to revive slowly has been so upset or halted the past 6 yr by war that tariffs, whether high or low, played little if any part in international trade.

DESPITE some belief to the contrary, a depression or even recession is not necessary or inevitable in 1947 or the ensuing years provided good judgment is jointly exercised by government, management and labor.

This, in effect, is the substance of the first report to the President by the Council of Economic Advisers which was created under the Employment Act of 1946 for the purpose of conducting a continuous study of the nation's production and employment. It contains no recommendations except by implication.

Essence of the findings to date is that the chief responsibility for prosperity lies within the ranks of business and labor. Continued high levels of production and employment are possible over the next several years, the report states, if labor and management are willing to sit down together and work out a "sensible" formula for the adjustment of "wage, cost, price and profit relations." Laws, the Council concludes, cannot force "capitalists to invest, employers to hire, or laborers to work."

IN fact, the Council implies, government should enter into the matter as little as possible and that it should carefully consider the timing, volume and distribution of its own expenditures in relation to those of private business and state and local governments. Public works should be delayed when possible until business production slows down.

Delayed demands, created by war production, should be filled first; then, production facilities should be turned toward increasing output of "those semiluxuries, those welfare and culture goods which are put within reach of our people as a whole by reason of our unparalleled productive capacity."

Basis of the Council's reasoning is that production at present is being driven by a strong domestic, as well as foreign, demand to catch up on durable goods which had piled up during the war. Because of good income and war savings, the general public is eager and able to maintain a relatively higher rate of consumption of nondurables.

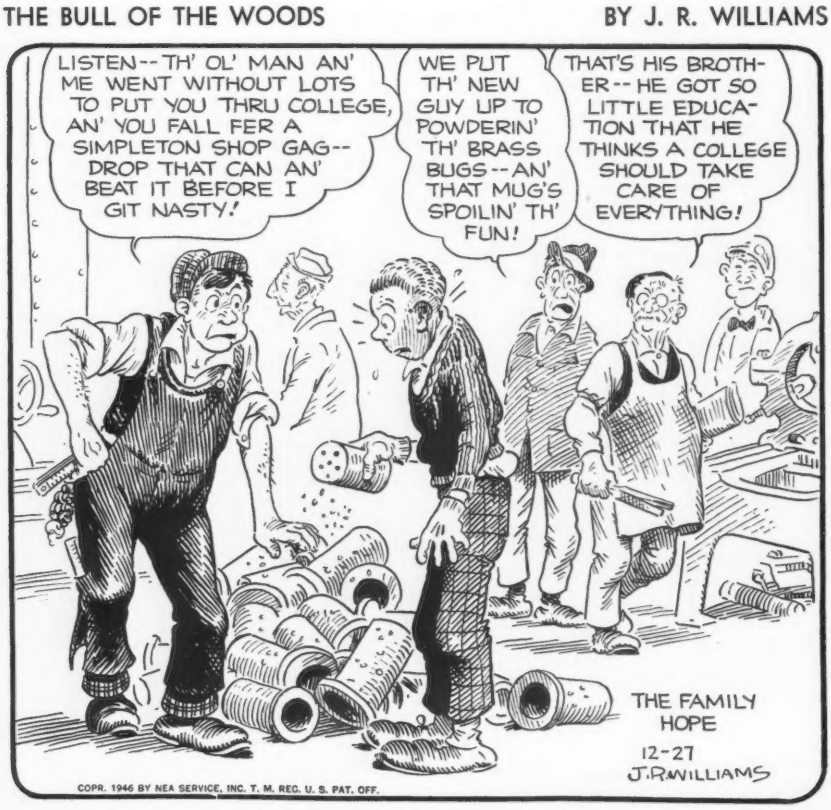
This demand for nondurables may be expected to continue as long as income levels are maintained. However, the demand for durables, such as housing, automobiles, refrigerators, and so on, must become sated in time and production along these lines drop back toward a replacement basis.

This might indicate a depression sometime later but the Council holds that this will happen only if the gradual shift in type of production and expenditure fails to take place. Wise planning after careful watching of trends could forestall it. This, too, apparently is the time when the government should begin to feed into the production line those public works which have been postponed.

"In spite of conditions which might make for a dip in 1947," the Council said, "we believe that courageous and sensible action by those responsible for the administration of private business relations (including labor unions) can at least hold such a recession to moderate proportions, if not actually avert it. . . . It is our belief that enough time is afforded in which wise policy and action on the part of labor, of management, of agriculture, and of finance, with a very carefully considered complementary role by government, will not only raise national prosperity to new levels but maintain it."

The Council's preliminary report was released by President Truman last week. Under the Employment Act, he will use the findings as a basis for his economic report to Congress. A second Council report must be submitted to Congress by Feb. 1 which will give its findings and specific recommendations to each of the proposals in the White House report.

THE BULL OF THE WOODS — BY J. R. WILLIAMS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WE PUT TH' NEW GUY UP TO POWDERIN' TH' BRASS BUGS--AN' THAT MUG'S SPOILIN' TH' FUN!
THAT'S HIS BROTHER--HE GOT SO LITTLE EDUCATION THAT HE THINKS A COLLEGE SHOULD TAKE CARE OF EVERYTHING!
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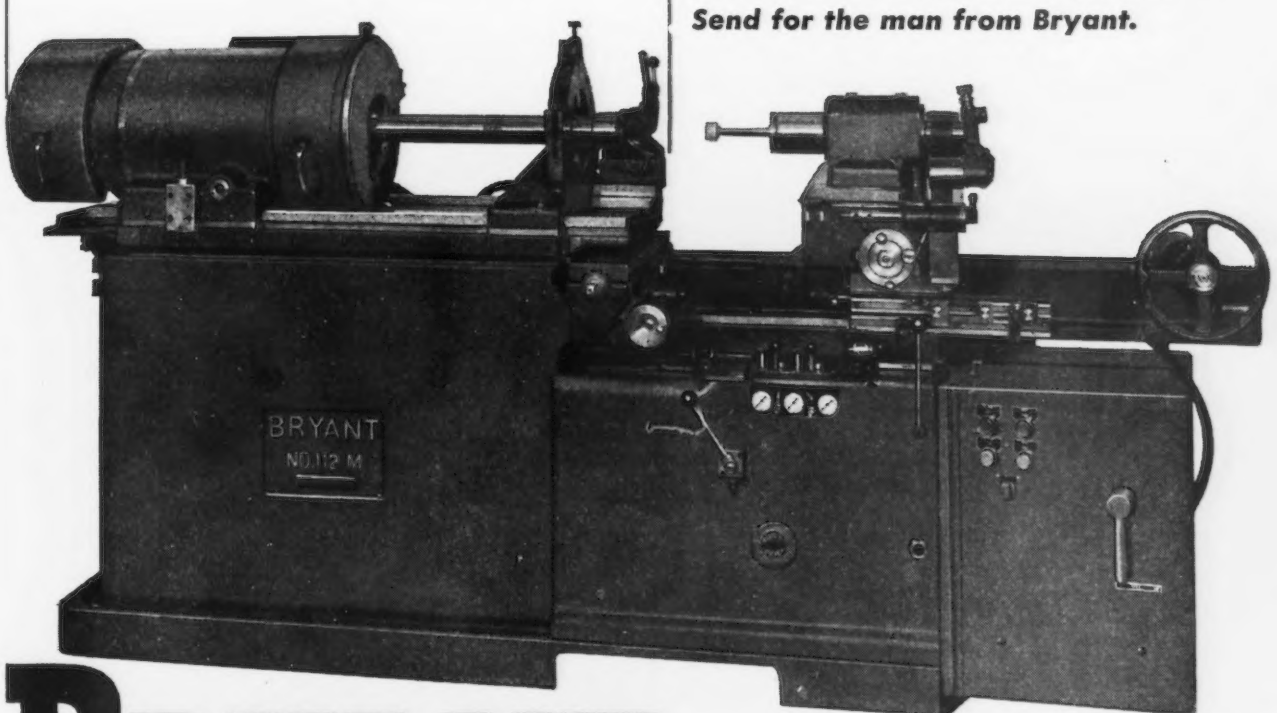

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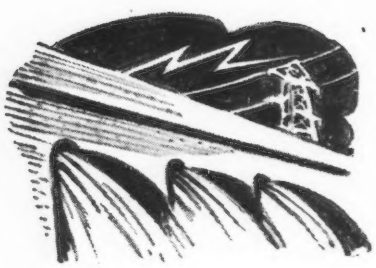
West Coast . . . .

ROBERT T. REINHARDT

• WAA does brisk trade in machine tools in Southern California . . . Purchase of Consolidated Steel not unexpected.



LOS ANGELES—Twelve million dollars' worth of machine tools have been sold to southern California and Arizona industry by War Assets Administration in its 14 months of activity. WAA inventory shows about $10 million worth of stock at this time. Probably $6 or $7 million worth more will be declared surplus in this region.

The Los Angeles area, before the war, absorbed about $4 to $5 million worth of machine tools per year. On that basis WAA has now sold this area the tools that it will require up to the middle of 1950, and the tools yet to be received should equip it to the end of 1952, according to L. Z. McKean, chief of the Metalworking Machinery Div., War Assets Administration, Los Angeles Region.

"The impact on the machine tool business here in southern California has been tremendous," McKean said. "The president of the new Machinery Dealers' Assn. and head of our largest Los Angeles tools distributing firm tells me that they are practically at a stand-still because of our activity. The fact that they can't get any new merchandise has a great deal to do with their problems, but we are hurting them without a doubt. This particular firm, the largest tools distributor, has an annual business averaging one and one-half million dollars. In June of this year, six WAA salesmen here sold twice as many tools as this firm ever sold in a 2-yr period. I do not mention this for any comparison of sales effort, but to show the tremendous cut we are taking in one of the major businesses in southern California."

To sell the $12 million worth of machine tools previously mentioned, WAA employs seven or eight salesmen and utilizes the sales forces of the 38 machinery dealers associated with it on an Approved Dealer basis. These firms employ an average of five salesmen each, or approximately 190 altogether, and have sold $1,249,000 worth of WAA tools.

With this volume of machinery pushed into the local market so far ahead of normal absorption, will there be a future outlet for the balance of WAA tools? Mr. McKean thinks there will be.

"In the quarter of a century that I have lived in Los Angeles, I have seen this region change from an orange orchard, a grape vineyard and a moving picture empire to one of the largest industrial areas in the United States. It is into this metropolitan area that the major part of our tools has gone and there are lots of reasons to believe that it will absorb the remaining tools and those to come."

MR. McKEAN'S reasons for optimism are many, all concerned with the rapid growth of the area. The population of the 11 western states, he pointed out, has increased since 1920 at twice the national rate. Fifty per cent of this growth has been in southern California. Over 100 national manufacturers have established branches in Los Angeles. In 1945, investment in new factories and expansion totaled $83 million. A basic iron and steel industry has been established. There are cheap electric power, fair labor conditions, cheap fuel, both gas and oil, and the longest working year of any area in the United States. The industrial future looks good, he believes.

"The broad field of industry has been expanding at a comparatively even rate since 1929. This year, during the first 9 months of 1946, 206 new industries started up in the Los Angeles district. They represent a capital investment of $56 million, and employ 15,000 people. They purchased a lot of War Assets' used machinery. We are counting on them to do it the remainder of this year and as long next year as we have tools to furnish them. Further new industry will come here due to the advantages mentioned previously and the fact that industrial plants cost 25 pct less to build in Los Angeles than in the East because of weather conditions."

WAA sales will continue to come from three sources: The establishment of new industry; the expansion of existing industry; and the breakdown through accident or fire of existing tools.

The first sales point suggested by Washington, that is, to push the sale of machine tools as replacement of obsolete equipment, proved unusable in this area, Mr. McKean said. Industry here has grown up in so short a time that it is comparatively modern in equipment. Its tools are mostly individually motor driven. The Income Tax Division will allow business to depreciate and amortize its tools over a seventeen year period. On this basis there are relatively few second-hand tools which WAA can replace with other second-hand tools. Because its merchandise is of the long-life durable investment type, it is unable to force sales by price cutting.

"Washington is thoroughly familiar with this phase of industry, as the regulations show which have been set up for our operation. We are able to sell tools only: (1) under the Clayton Formula, (2) the fixed price catalog, or (3) in the case of tools twenty-five years or older, of which there are only *six* in this region, on sealed bid."

SAN FRANCISCO—Purchase of the facilities of Consolidated Steel Corp. by Columbia Steel Co. was not entirely unexpected as rumors of this transaction have been kicking around steel circles for the past 6 months or more. Nonetheless, the announcement of the transaction created considerable interest and speculation among

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both steel users, and producers competitive to the U. S. Steel Corp.

Consolidated has been a large user of plate, structurals and wire products and consequently the cornering of this substantial market by Columbia will have a marked effect on the sales program of the Kaiser Co., Inc., and Bethlehem Pacific Coast Steel Corp. which have been suppliers of a considerable portion of Consolidated's requirements.

Spokesmen for these two companies were reluctant to reveal the quantity of materials previously sold to Consolidated but they were very optimistic about their ability to find new markets for tonnages previously sold to this user. A. B. Ordway, vice-president and general manager for Kaiser Co., Inc., said, "With the expansion going on now in the West, there is certainly room for everybody."

It is generally conceded that the purchase of this large steel fabricator by Columbia was a very strategic move on the part of U. S. Steel Corp. and would go a long way toward providing an outlet for large tonnages of steel from the Geneva, Utah, plant. There is one question in the minds of many observers who know that the purchase price was given as $8,293,319 and that in December 1945 the facilities of Western Pipe & Steel were purchased for $6,217,363. Having reported a gross income of slightly more than $300 million for the fiscal year ending August 31, 1945, it had been assumed that the facilities of Consolidated would be worth considerably more than the $2 million differential indicated by these two purchase prices.

Consolidated statement for the fiscal year ending Aug. 31, 1946, released last week, shows that work performed on contracts totaled $91,676,870 which compares to $299,302,678 for 1945. Net profit from operations reported for 1946 was $2,459,359 compared to $5,947,574 for 1945. Performance bonuses earned in 1946 totaled $6,203,038 and in 1945, $6,011,404. Provision for federal income tax in 1946 was $4,033,800 including $223,600 carry back adjustment, as compared to $8,590,400 in 1945. Net income after reduction of contingency reserves for 1946 was $6,469,890 and in 1945, $3,505,746. Net earnings per common share for 1946 based on 241,617 shares was $26.20. In October 1946 the stock was split two for one, which means that the net per share for 1946 was $13.10, based on the number of present outstanding shares. The net per share in 1945 based on 241,617 shares was $13.58, or $6.79 based on number of present outstanding common shares.

IF a story in one of the San Francisco newspapers to the effect that approximately 7000 tons of steel including 3000 tons of sheet metal had been sold to the Dutch Government caused a few mild strokes of apoplexy among sheet hungry fabricators, perhaps the statement made by the local WAA office to the effect that none of this material came from the West Coast might prove a palliative. The San Francisco WAA office reports that a purchasing commission representing the Dutch Government did buy approximately $600,000 (acquisition cost) worth of hand tools, automotive parts, service station equipment and other miscellaneous materials, but no steel was included in the shipments. It is also pointed out that all of the material sold to the purchasing commission had been previously offered to nonpriority buyers. This purchasing commission has been in this country for some time and has probably bought some quantities of steel in other areas. Headed by J. Vennick, the buyers have visited principal WAA surplus site sales and district offices in their search for materials for rehabilitation of their homeland.

Foundries in this area are getting increasingly alarmed over the shortage of pig iron and several of them report that unless some help is forthcoming in the next few weeks, there will be actual closures and serious curtailment of production.

Users of gray iron castings have been searching for assistance as far east as Pittsburgh but they report little or no encouragement.

It is stated that the start of operations of the Ironton-Utah blast furnace will help the situation to some extent and it is believed that the third blast furnace at Geneva may be blown in soon to help relieve the shortage of both basic and foundry pig.

SALT LAKE CITY—The purchase of the Consolidated Steel Corp. facilities in California by the Columbia Steel Co. was received here with more than usual interest because it is appreciated that the facilities of this California corporation will provide a market for a large quantity of plates and structurals from the Geneva Steel plant.

Production at the Geneva plant has already risen above the prestrike level and additional increases are contemplated before the end of this year. The plate mill is now operating on three turns for a 5-day week and present plans call for bringing in a third battery of coke ovens and two more open-hearth furnaces in addition to the four now operating by the end of the month. The structural mill will probably be operating on a two turn basis sometime this month.

The railroad car shortage which has held down coal and iron ore deliveries for sometime is reported as having eased up considerably through the shift of cars from Bessemer & Lake Erie Railroad to this area.

The approaching wage negotiations in the steel industry are naturally being watched closely. Last year the Metals Trade Council of AFL, which represents the employees at Geneva, sat tight through the steel strike and settled for the general industry increase after it was all over. At the moment it appears that the same strategy will be followed this year by the AFL leaders as a work stoppage might upset their rather delicately balanced situation. The CIO United Steelworkers of America is carrying on an aggressive organizing campaign, presumably with the intention of asking for another election as soon as NLRB will consider such a petition. The last election was extremely close and necessitated a judgment being passed by NLRB officials on the validity of several votes.

The blast furnace at Ironton, Utah, owned by Columbia Steel Co. which was down for relining when the coal strike began, has been blown in and is to make several casts of gray iron for foundry use which is in serious short supply throughout the West. How long this type of material can be produced is doubtful inasmuch as basic pig is likewise very short because of the heavy demand created by the lack of scrap on the West Coast.

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European Letter

JACK R. HIGHT

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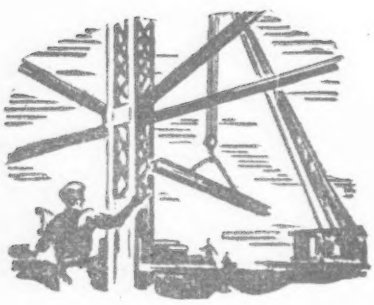

OSLO — The first operations, including the construction of dwellings for workmen, are going forward at the site of the Norwegian Government's new steelworks at Mo i Rana. Efforts are being made at the moment to hire a number one man for the project, but no contracts have actually been signed for steel mill equipment. Basic decisions have been reached as to the furnace equipment required, but the outlines of the rolling program are not yet complete.

In order to avoid the ineconomies of too wide a product line with a limited market for each product, there is a hope that the new Norwegian mill will be able to coordinate its rolling program closely with that of Swedish carbon steel producers, but as yet this coordination is entirely on the conversational plane. Approaches have been made to the privately-owned Swedish steel firm, Domnarvet, and to the government-owned Norrbotten, and it is likely that some such cooperative program will in fact be developed as there is somewhat the same anxiety in Sweden to specialize the rolling programs.

The establishment of a steelworks in Norway has been a controversial subject in local circles for 40 yr. There are those who have eyed Norway's expanding steel consumption, which grew to 400,000 tons per year before the war, and Norway's yearly exports of iron ore to Germany, as a basic ineconomy which would at some point in history require correction. There have always been equally vocal circles which stoutly maintain that Norway cannot efficiently produce iron and steel and that the flow of trade in and out of the country is as important as self-sufficiency might be.

The decision in the middle of this year by the Norwegian Parliament to proceed with the production of an integrated steel plant has neither silenced the critics, nor has it removed all bitterness which the debate engendered. Proponents of the plan are confident of its success, although they have wrangled among themselves as to the most logical site, and are still wrangling among themselves as to the choice of rolled products.

They hint broadly that the opposition to the steel mill here in Norway comes largely from the powerful local shipping interests who represent the largest private firms in Norway. The inference is clearly given that the shipping companies would have reason to regret the loss of prewar ore shipments to Germany (averaging approximately 100,000 tons between 1927 and 1932), and the complementary absence of finished steel shipments to Scandinavia.

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On the basis of this report a "study" company was formed in 1939 to draw up a detailed plan and receive bids for main items of construction. When the war began this program was stopped, although while the refugee government was located in London there was one man engaged in proceeding with any details which might profitably be acted upon to facilitate construction at the end of the war.

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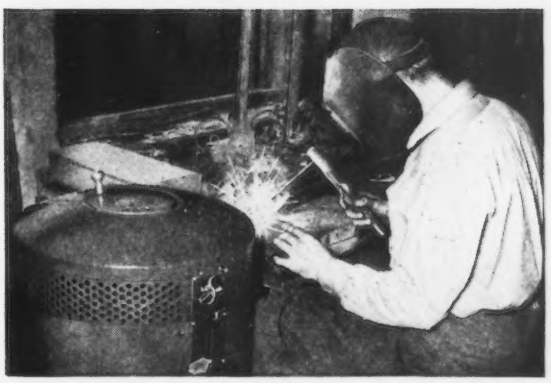

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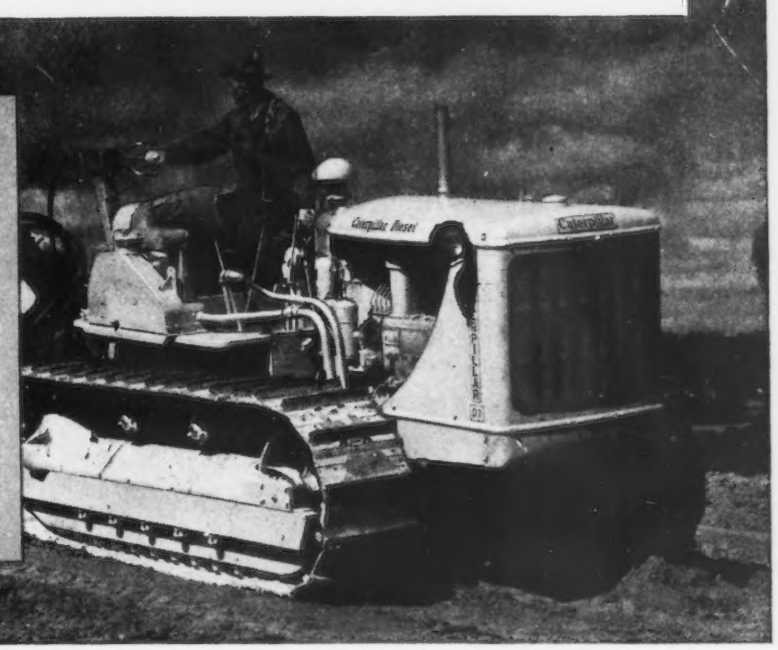

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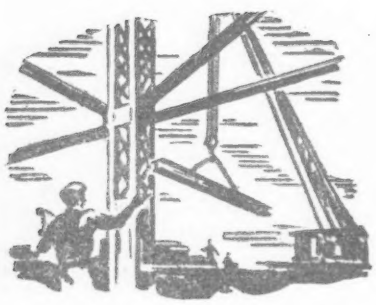

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June of this year, the entire construction program is estimated at about 200 million Norwegian kroner ($40 million). The Norwegian Government provided the first 50 million this year to permit work to proceed on the first stages of the program.

A board of directors, including three of the men who served on the previous committee, has been appointed, and the Norsk Jernverk will be piloted under their guidance as a private company. Although already committed to the site at Mo i Rana, the board remains free to alter the plans as brought forward by the committee, and will generally have complete freedom of action within the bounds permitted by the appropriations of the Parliament.

THE site at Mo was chosen because of the proximity of a government power development at Glomfjord about 50 km away. There is approximately 120,000 kw of installed capacity available at the power plant and approximately 1000 in use at the present time. Part of this development was originally reserved for use by the Norwegian aluminum company, Hoyang, but its consumption recently has been very small.

There are no ore mines in the immediate vicinity which are open at present, but shipments of Norwegian ore from the far north and from the south as well will take care of initial production needs. It is planned at a later period to start working reserves around Mo where it is estimated that there are approximately 1000 million tons of available reserves. The site is on a port which is open the year round, and it is expected that shipments of both ore and finished products will be 100 pct by water.

Present plans, subject to possible deliveries of machinery from either the United Kingdom and the United States, call for the first production of pig iron in 1949 and the first rolling of steel in 1951. The first production unit will consist of three electric pig iron furnaces designed by Det Norske A/S for Elektrokemisk Industri, each with an annual capacity of 55,000 metric tons, to which will be added some scrap for 200,000 tons of production in the first stage.

The pig iron furnaces will be of fairly standard construction, except that they will be designed for 24,000 kva which is somewhat larger than electric pig iron furnaces which have been built in the past. The actual intention at present is to use only 18,000 kva, with the provision for expanded utilization if advisable. The largest electric pig iron furnaces built previously were 13,000 kva.

CONSIDERABLE criticism of the site at Mo has been based on the absence of a consuming market in the region. At present all of Norwegian industry is located in the south, with Trondheim being the northernmost important industrial center. The government hopes, however, to take advantage of a comparatively easier labor situation in the north to develop there around a steelworks an expanded industry of considerable importance.

Steel melting in the first stage of the program will be in bessemer and electric arc furnaces. As previously mentioned, the complete list of products to be rolled is as yet undecided, but guidance may be obtained from studying the statistics of Norwegian prewar consumption. Shipbuilding materials, including primarily plates and sections, were the biggest tonnage item, averaging 160,000 metric tons per year.

There was also a fair amount of wire rods and bars, and increasing tonnages of thin sheets consumed during the prewar years. One of the new staff of the company is at present touring the industry in America studying sheet production with a view to considering both continuous and semicontinuous output in Norway. Any decision, particularly with regard to sheet production, will of course be strongly affected by the success of efforts to coordinate Norwegian production with that of other countries.

In addition to the effort to correlate rolling plans with Sweden, approaches have been made to the British industry on the same subject. When initial suggestions were made to British officials about a year ago, London officials strongly favored complete self-sufficiency as the only dependable system for the United Kingdom. It is understood, however, that British opinion as time goes on increasingly favors international steel cooperation such as the Norwegian firm is attempting to foster.

CPA Rules Foreign Freight Car Orders Must Take Back Seat

Washington

• • • **Foreign orders** for freight cars were given a back seat by CPA on Dec. 17, when that agency ruled that freight car builders could not place orders for steel to be used in the production of cars for export on orders received after Nov. 30, unless written authorization is granted. Export orders include those for delivery outside the United States, its territories or possessions, and Canada.

Under Dir. 18 to Order M-21, applications for export orders are to be made by letter to CPA, furnishing complete information as to (1) Production schedules classified for domestic cars and export cars ordered before Nov. 30, and export cars ordered after Nov. 30, (2) steel tonnage on hand, (3) the additional tonnage for which authorization is requested, and (4) the effect which such an authorization would have on domestic car production.

At the same time, CPA announced that freight cars awaiting repairs totaled approximately 67,294 units on Nov. 1, or approximately 4 pct of all cars available for service. This percentage represents a net reduction of 15,514 "bad order" cars or approximately 18 pct of the backlog existing in July 1946. On that date CPA, working with the steel industry, started expediting deliveries of steel to the car repair shops.

While this reduction in bad order cars was an encouraging development, CPA said, production of new freight cars has not progressed as rapidly as had previously been anticipated. This lag occurred primarily because the car builders had scheduled export orders last year when domestic demand had not yet appeared in full force. The car manufacturers said that a rescheduling of operations in the midst of production would have resulted in inefficient operation of their plants and severe financial losses, and would not have benefitted the domestic program proportionately.

SEE FAIRBANKS-MORSE FIRST FOR MOTORS

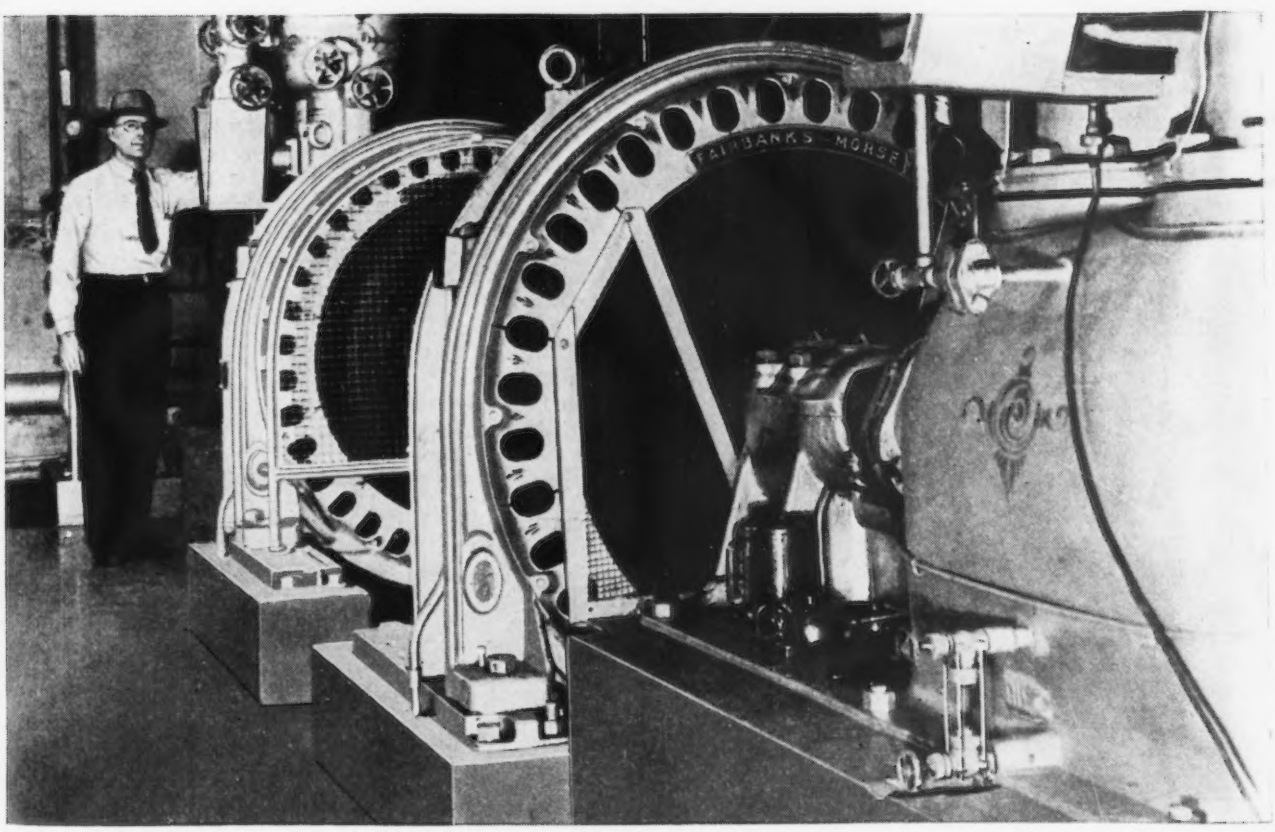
IMPROVED plant operation is something you can count on when you use Fairbanks-Morse *Synchronous* Motors.

These dependable units assure a better plant power factor, constant speed operation over entire load ranges, and truly economical service. Designed with modified torque characteristics, they can be adapted to a wide variety of applications.

Available in a full range of high and low-speed types, these motors are part of a full line of Fairbanks-Morse Motors and Generators now serving industry with performance-boosting economy. Write for details today.

Fairbanks, Morse & Co., Chicago 5, Illinois.

Fairbanks-Morse synchronous motors driving compressors



Fairbanks-Morse

A name worth remembering

Diesel Locomotives • Diesel Engines
Scales • Motors • Pumps • Generators
Magnetos • Stokers • Railroad Motor
Cars and Standpipes • Farm Equipment

PERSONALS

HANS A. EGGERSS, president, Continental Can Co.

• **Hans A. Eggerss** has been elected to the presidency of Continental Can Co., Inc., New York. **Carle C. Conway,** who has heretofore been acting both as chairman of the board of directors and as president, will remain chairman of the board and chief executive officer of the company. Mr. Eggerss joined the Continental organization in December 1942, when that company acquired the Container Co. of Van Wert, Ohio, of which Mr. Eggerss had been president. Shortly after joining Continental as head of its paper container division, Mr. Eggerss was elected a vice-president of the company and since February 1946 has been its executive vice-president.

• **John G. Fritzinger** has been appointed district sales manager of the Carborundum Co.'s Philadelphia sales office. He had been a sales engineer for the refractories division of the company in the Philadelphia area since 1924. He succeeds **Williard J. Griffith,** who has resigned to form an industrial supply company with **Paul E. Raguse,** who has resigned his position as industrial salesman in the Philadelphia area.

• **John W. Thayer** has been appointed sales manager of the Milwaukee Hay Tool Co., Milwaukee. For the past 8 yr he has been associated with United Cooperatives at Alliance, Ohio, and for the past year has been manager of United's barn equipment division.

° **J. Milton Hagler** has been elected president of Tay-Holbrook, Inc., San Francisco, to succeed **Hugh E. Oliphant,** who has retired from active service but will continue with the firm as a director. The following have been appointed vice-presidents: **Arthur N. Brewer,** manager of purchases; **Arthur M. Walton,** manager of sales; **James P. Owens,** manager of Fresno branch; **Francis J. Fay,** manager of Sacramento branch; **Harry B. Oliphant,** manager of Oakland branch; **Paul H. Kankel,** manager of San Jose branch; and **Vincent Kavanaugh,** manager of Stockton branch.

• **C. E. Herington** has been appointed manager of the sales engineering department of the Meehanite Metal Corp., New Rochelle, N. Y. Mr. Herington has been director of advertising and sales promotion and will continue these duties along with the direction of the new department.

• **Charles Knupfer,** senior vice-president of the Carborundum Co., Niagara Falls, N. Y., is retiring as of Jan. 1. **T. B. Foot,** assistant secretary, **George W. Chromann,** associate manager of the engineering and product development division, and **George H. Huntley,** who has been serving in an advisory capacity in the planning department, are also retiring from the company.

• **Frederick J. Lindauer** has been named manager of Fairbanks, Morse & Co.'s Washington office, replacing Robert E. Post, recently deceased. Mr. Lindauer has been with Fairbanks, Morse & Co. for some time, having originally started in the Three Rivers, Mich. plant in 1923. He joined the Washington organization in 1935 and was Mr. Post's assistant at the time of the latter's death.

• **Lee C. Daniels** has been appointed chief engineer of Towmotor Corp., Cleveland. He was formerly associated with the Oliver Corp., the Cleveland Tractor Co., the Twin Coach Co. and White Motor Co.

CARL L. ZAK, general manager of sales, Pittsburgh Steel Co.

• **Carl L. Zak,** formerly assistant sales manager since April 1945, has been appointed general manager of sales of the Pittsburgh Steel Co., Pittsburgh. Before associating himself with Pittsburgh Steel he was for 3 yr secretary of the Seamless Steel Tube Institute. His background includes 6 yr of sales engineering, inspection and mill scheduling for Globe Steel Co. and 6 yr in various sales capacities with Younstown Sheet & Tube Co. **L. A. Ver Bryck** has been appointed assistant general manager of sales, effective Jan. 1. Mr. Ver Bryck's appointment involves his withdrawal from the company's New York office, where he served as district sales manager. Succeeding him as New York district manager of sales is **Joseph G. Smith,** who has been manager of Pittsburgh district sales until this new appointment. **Walter D. Schlundt,** former district sales manager at Detroit, will replace Mr. Smith as district sales manager at Pittsburgh. Named as assistant district sales manager in the home office is **Robert W. Mullin. Edward L. Dull** becomes district sales manager at Detroit. He had previously been connected with Pittsburgh Steel Co.'s Chicago office.

• **A. Robert Noll** has been appointed manager of the patent department of International Business Machines Corp., New York. He has been a member of the IBM patent department staff since 1933.

LEE TREESE, vice-president in charge of manufacturing, Tucker Corp.

• **Lee Treese** has been named vice-president in charge of manufacturing for the Tucker Corp., Chicago. Mr. Treese resigned his position as production superintendent of the Ford Motor Co. to join Tucker. He entered the Ford Motor Co. as a tool and die maker after completing his apprenticeship at Angola, Ind.

• **W. R. Wilinson** has been appointed vice-president of the Johns Manville Sales Corp., New York. **C. B. Burnett** has been named vice-president of Johns Manville Products Corp.

• **Spencer T. Olin,** vice-president of Olin Industries, Inc., Alton, Ill., has been elected a director of Laclede Steel Co., St. Louis.

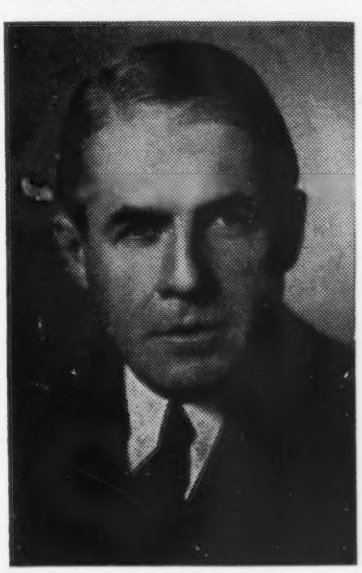
• **J. E. Lundy** has been named director of the financial planning and analysis department of the Ford Motor Co., Dearborn, Mich. He formerly directed the research and analysis department for the office of statistical control in the Army Air Force Headquarters. Named director of the contract coordination department of Ford is **G. J. Lynch,** former director of the contract department for Fisher Body. **J. D. Wright,** executive assistant to the chief of air staff in Army Air Force Headquarters during World War II, has been appointed director of the administrative planning department.

• **W. H. Lantz, Jr.** and **Rey F. Frenger** have been elected vice-presidents of the Federal Electric Products Co., Newark, N. J. Mr. Lantz, who came to Federal in 1941, will be the executive head of the Hartford Div. Mr. Frenger joined the company in August of this year and will be in charge of the Wm. Wurdack Div. in St. Louis.

• **John C. Campbell** has been appointed manager of industrial engine sales for Detroit Diesel Engine Div. of General Motors Corp. **James W. Brown** has been named advertising manager of Detroit Diesel. Mr. Campbell spent several years with Wright Austin Co. and with frigidaire division of General Motors. He joined Detroit Diesel in 1942. Mr. Brown recently held the position of product news manager for Detroit Diesel.

• **H. H. Richardson** has been appointed president of Aluminium Laboratories, Ltd., and elected to the board of directors of the Aluminum Co. of Canada, Ltd. As president of Aluminium Laboratories, Ltd., Mr. Richardson will direct the research and development activities undertaken for the Aluminium, Ltd. group of companies in research laboratories at Arvida and Kingston in Canada and Banbury, England. Mr. Richardson has spent 22 yr in the aluminum industry in Canada, Great Britain and Switzerland.

H. H. RICHARDSON, president of Aluminium Laboratories Ltd., member of board of directors of Aluminum Co. of Canada, Ltd.



WILLIAM S. SAYLOR, manager of sales, Cleveland district, Carnegie-Illinois Steel Corp.

• **William S. Saylor** has been appointed manager of sales in the Cleveland district of Carnegie-Illinois Steel Corp., Pittsburgh, a U. S. Steel subsidiary. He will assume his new duties on Jan. 1, succeeding **W. P. Andrews,** who has resigned. Mr. Saylor joined Carnegie-Illinois as a chemist at Edgar Thomson Works in 1915. He entered the sales department in 1924 in the bar division of the general sales office in Pittsburgh. He was transferred to the Cleveland district sales office of Carnegie-Illinois as a salesman in 1926, and was made assistant manager of sales in the Buffalo suboffice 10 yr later. He became manager of sales of the Boston sales office in 1940 and has been assistant manager of sales in the New York office since 1944.

• **Dr. Johan Bjorksten** has been appointed president and treasurer of the new corporation of Bjorksten Research Laboratories, Chicago. **Stuart O. Fiedler** has been named vice-president, and **A. Charles Lawrence,** secretary.

• **C. A. Lahey,** vice-president of the Quaker Oats Co., has been elected chairman of the board of Litchfield & Madison Ry. Co., Chicago. Mr. Lahey has had broad experience in transportation, having been general freight agent of the Chicago, Milwaukee, St. Paul & Pacific R.R. as well as occupying other executive positions with that line.

ROBERT A. WAHL, whose appointment as sales manager of the Union Steel Castings Div. of Blaw Knox Co. was announced in the Dec. 19 issue.

• **Abner B. Wellborn** has been named superintendent of the metallurgy division of the General Electric Co.'s chemical department, Pittsfield, Mass. In 1935 he became associated with the company's general office and the following year joined the wage rate and planning section of the Schenectady works. He was made supervisor of wage rate, production and planning in the General Electric plant at Fort Edward, N. Y., in 1942 and was named assistant to the superintendent of the carbon products manufacturing division in 1945. **Ernest E. George** has been appointed engineer of the metallurgy division. He joined the General Electric Co. on the test course in 1933 and was associated with the Schenectady works laboratory from 1935 until 1945, when he became a member of the carbon products engineering division. **Thomas Grover** has been made sales manager in charge of marine electronic equipment in General Electric Co.'s transmitter division, with headquarters at the Syracuse, N. Y. plant.

• **R. S. McNamara** has been named assistant director of planning for the Ford Motor Co., Dearborn, Mich. Mr. McNamara was professor of business administration at Harvard University graduate school and served in the statistical control section of the Army Air Force during World War II. **W. C. Boyle,** with 24 yr experience in the cost accounting department of Fisher Body Div. of General Motors Corp., has been named director of the cost accounting department of Ford Motor Co. Appointed accounting manager of steel operations for Ford is **E. R. McGauley,** former controller and assistant treasurer of the Ordnance Steel Foundry, Bettendorf, Iowa. **K. D. Cassidy,** formerly a member of L. D. Crosoe's staff at Bendix Aviation, has been named accounting manager for the Highland Park plant. **E. H. Dunn,** former treasurer of Berry Brothers, Inc., has been appointed accounting manager for assembly plant operations. **Charles T. Ellis,** former factory manager for the Acme White Lead & Color Works, Detroit, will direct all purchases of paint, paint raw materials, petroleum products, pigments and oils for Ford Motor Co.

EDWARD A. SIPP, whose appointment as manager of the railway division of Reynolds Metals Co. was announced in the Dec. 19 issue.

• **Edward J. Lewis** has been appointed assistant to W. E. Ireland, manager of passenger car tire sales of the B. F. Goodrich Co., Akron, Ohio. Mr. Lewis, with the company 17 yr, has been recently handling sales promotion on passenger car tires, accessories and repair materials, batteries and spark plugs. **William E. McCormick** has been appointed chief of the industrial hygiene department, coming to B. F. Goodrich from the state health department of Georgia, where he had been in industrial hygiene work.

• **H. R. Sheaffer** has resigned as vice-president in charge of sales of the Malone Bronze Powder Works, Inc., New York.

...OBITUARY...

• **Frederick R. Atkinson,** 66, president of the F. R. Atkinson Auto Spring Co. of Hamburg, N. Y., died Dec. 8.

• **William L. Robison,** 47, superintendent of the Bethlehem Steel Co.'s strip mill at Lackawanna, N. Y., died Dec. 9. Before joining Bethlehem, he had been superintendent of the old Seneca Iron & Steel Co., which the former absorbed.

• **William F. Stearns,** 72, retired New England division manager of the American Radiator Co., Pittsburgh, died Dec. 8.

• **David FitzGerald,** 51, manager of employee relations for the plastics divisions of the General Electric Co., Pittsfield, Mass., died recently after an illness of several months. He had been associated with the company for 25 yr.

• **Samuel R. Cristall,** 76, founder and head for nearly 50 yr of Samuel R. Cristall & Son of Buffalo, died Dec. 10.

• **Edward G. Meckstroth,** 58, vice-president and general manager of the Morris Machine Tool Co., Cincinnati, died recently. He had been associated with the company for 30 yr.

• **Herbert B. Wykes,** 63, former superintendent of the DeWalt Machine & Engineering Co., Worcester, Mass., for 15 yr, died recently.

• **John Warning,** 77, former coke oven superintendent at the Lackawanna, N. Y. plant of the Bethlehem Steel Co., died Dec. 12. He was employed by the company for 40 yr and retired in 1941.

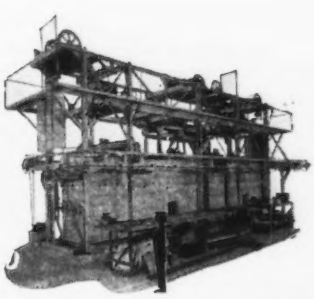
This morning the advertising department caught hell!

This is no joke, son. We don't know how it happened—but our vice-president heard of a heat treating superintendent who didn't know Lindberg made **big** special heat treating furnaces.

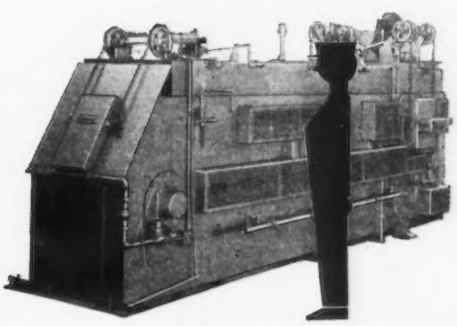
This fellow knew that we'd built thousands of standard Cyclone tempering furnaces and Hydryzing furnaces—and he knew that we'd turned out a lot of brazing furnaces, too. But he didn't know that Lindberg made big special furnaces—conveyors, rotary hearth jobs, and car bottom furnaces.

So the vice-president (he's in charge of sales) really let go at the Advertising Department. This is a cleaned-up version of what he said—"Here the Sales department almost covers the country with these big installations, and you guys in the Advertising Department keep it a secret. How about maybe mentioning in *just one* of your ads that for years we've been selling these big jobs, etc. etc. etc."

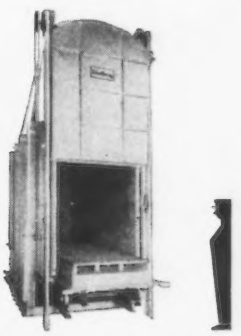
Well, we had to do something to keep the guy quiet—he *does* sign our pay checks, you know. So will you take a quick look at these pictures—and by all means read the captions.



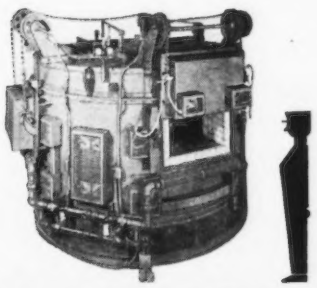
Special Gun-Barrel Furnace—automatically normalizes, hardens, and tempers 2,385 gun barrels every 24 hours.



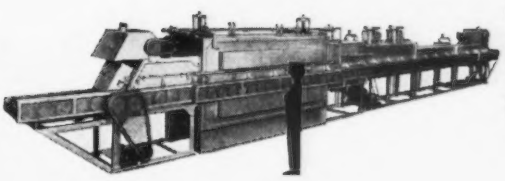
Conveyor Hydryzing Furnace—for production hardening of nuts, bolts, springs, wrenches, etc.



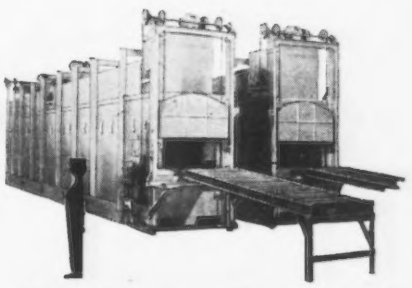
Car Bottom Tempering Furnace—for production tempering and stress relieving of large castings and welded structures.



Rotary Hearth Hydryzing Furnace—for production hardening that requires hand quenching.



Roller Hearth Brazing Furnace—for production brazing of heavy work such as engine blocks and gears.



Chain Conveyor Furnaces—for production heat treatment of aluminum aircraft parts.

LINDBERG ENGINEERING CO., 2452 W. Hubbard St., Chicago 12, Illinois

LINDBERG FURNACES

Dear Editor:

CASTINGS SPECIFICATIONS

Sir:

Can you tell us where we can obtain a copy of the ASTM specifications for gray iron castings in various classes? Also, can you recommend a good book on cupola melting practice for small gray iron foundries?

J. S. FITZ
Manager

Fitz Water Wheel Co.
Hanover, Pa.

● A copy of ASTM specifications for gray iron castings in various classes can be obtained from the American Society for Testing Materials, 260 So. Broad St., Philadelphia. In answer to your second question, we recommend the "Handbook of Cupola Operations," published by the American Foundrymen's Assn., 222 W. Adams St., Chicago 6.—Ed.

METAL PRODUCTS COATING

Sir:

We would like to receive a copy or tear sheets of the article covering a varnish composed of alkaline silicate of aluminum, published in the July 22, 1943 issue.

ACCIAIERIE E FERRIERE LOMBARDE FALCK

Milan, Italy

● Tear sheets of "Rust Resistant Finish for Metal," which describes Armor-Vit, developed by the Chicago Vitreous Enamel Product Co., are being forwarded.—Ed.

PHOTOSTATIC COPY

Sir:

We have been requested by one of our engineers to furnish one photostatic copy of "Torque Values for Standard AN Bolts and Nuts," on p. 59 of the Oct. 10 issue. May we have your permission to make this photostat?

C. A. ELLIS
Supervisor
Technical Service Div.

General Electric Co.
Schenectady

● You have our permission.—Ed.

REQUEST FROM SHANGHAI

Sir:

Can you furnish us with addresses of manufacturers of crown cork machinery, sewing machinery, knitting machines and paper bag machines? We would like to receive catalogs and price lists of this equipment.

E. R. KLEEMAN
Manager

Simplex, Engineering & Trading Co.
Shanghai, China

● Extensive lists of manufacturers of the various type machines you listed are being mailed to you.—Ed.

STEEL PROPELLER BLADES

Sir:

On the "Newsfront" page of the Nov. 7 issue there is an item mentioning work being done on steel propeller blades for small civilian planes. Can you give us the address of Engineering Research Corp. that you state is carrying on this experimental work?

W. F. WATSON
Electroforming Dept.

U. S. Rubber Co.
Detroit

● Engineering & Research Corp. is located at Riverdale, Md.—Ed.

LIGHT GAGE STEEL

Sir:

We are interested in knowing how we can obtain further information relative to the standards set up by the engineers as outlined in your Nov. 28 issue, p. 140, in the article, "Announces Standard Design for Light Gage Steel for Construction."

A. G. LEBER
Manager
Production Engineering Dept.

Flxible Co.
Loudonville, Ohio

● More specific information on these standards can be found in a booklet entitled "Specifications for the Design of Light Gage Steel Structural Members," issued by the American Iron & Steel Institute, 350 Fifth Ave., New York.—Ed.

PRODUCTION CONTROL

Sir:

Please send us tear sheets of the article, "Production Control for Small Plants," which appeared in the July 25 issue, pp. 49 through 51.

MARVIN L. MILLER

Miller Mfg. Co.
Perth Amboy, N. J.

DESIGNATING SURFACE FINISH

Sir:

I would appreciate it if you would send me reprints of the articles, "Distinctive Symbol Adapted to Designate Surface Finish," by J. A. Broadston, in the Oct. 19 and 26, 1944 issues, and "Surface Roughness Standards for Actual Comparison," by the same author, in the Nov. 2, 1944 issue.

EMIL KITZMAN
Superintendent, Machine Shop

Link-Belt Co.
Philadelphia

● A reprint of the three-part article, "Measuring and Designating Surface Finish," is being sent you.—Ed.

METAL SPINNING

Sir:

Please forward article entitled "Metal Spinning Comes of Age," by T. J. Salow, Jr., which appeared in 1939, vol. 144 No. 8, p. 30.

A. COLE
Chief Engineer

Alloy Products Corp.
Waukesha, Wis.

● We regret our supply of the Aug. 24, 1939 issue is exhausted, but suggest you write to the author, T. J. Salow, Jr., general manager, Milwaukee Metal Spinning Co., Milwaukee, who may have some extra copies.
—Ed.

FUEL OIL TANKS

Sir:

Can you furnish us with a complete list of firms who make plain and punched obround and round heads for the manufacture of 275, 500 and 1000-gal capacity fuel tanks?

I. GOLDEN
Treasurer

Gold Seal Tank Co.
Fall River, Mass.

● The names of a dozen manufacturers of fuel oil tanks and components are being forwarded to you.—Ed.

BRADMASTERS

Sir:

Would you please advise us whether or not we can obtain bradmasters or bradsetters for use in applying wooden moldings?

R. H. McCULLOUGH
Maintenance Dept.

Schult Corp.
Elkhart, Ind.

● Markwell Mfg. Co. who used to make bradmasters advises us that they do not know if and when they will be back in production on this item. However, we are forwarding names of some tool manufacturers who may be able to supply you.—Ed.

POWDERED IRON

Sir:

We understand there appeared in a recent issue of your magazine, an article on powdered iron by Ekstrand & Tholand. If you can furnish us with tear sheets or the issue containing the reference we will be grateful.

G. FORD

Research Laboratory
National Lead Co.
South Amboy, N. J.

● You probably have reference to the article, "Swedish Sponge Iron Powder Now Available at Lower Prices," which appeared in the Sept. 26 issue. We are forwarding tear sheets.—Ed.

MANGANESE PRICES

Sir:

We will greatly appreciate your furnishing us with the prices for August 1939 of the following two products: Ferromanganese, 0.10 pct C, 0.06 pct P, 90 pct Mn; and manganese metal, 96 pct Mn min., 0.2 pct C max, 1 pct Si max and 2 pct Fe max.

K. LORCK

Det Norske Aktieselskab for Elektrokemisk Industri, Inc.
New York 17

● Quotations from our price pages, for grades most comparable to those listed in your letter, are being forwarded.—Ed.

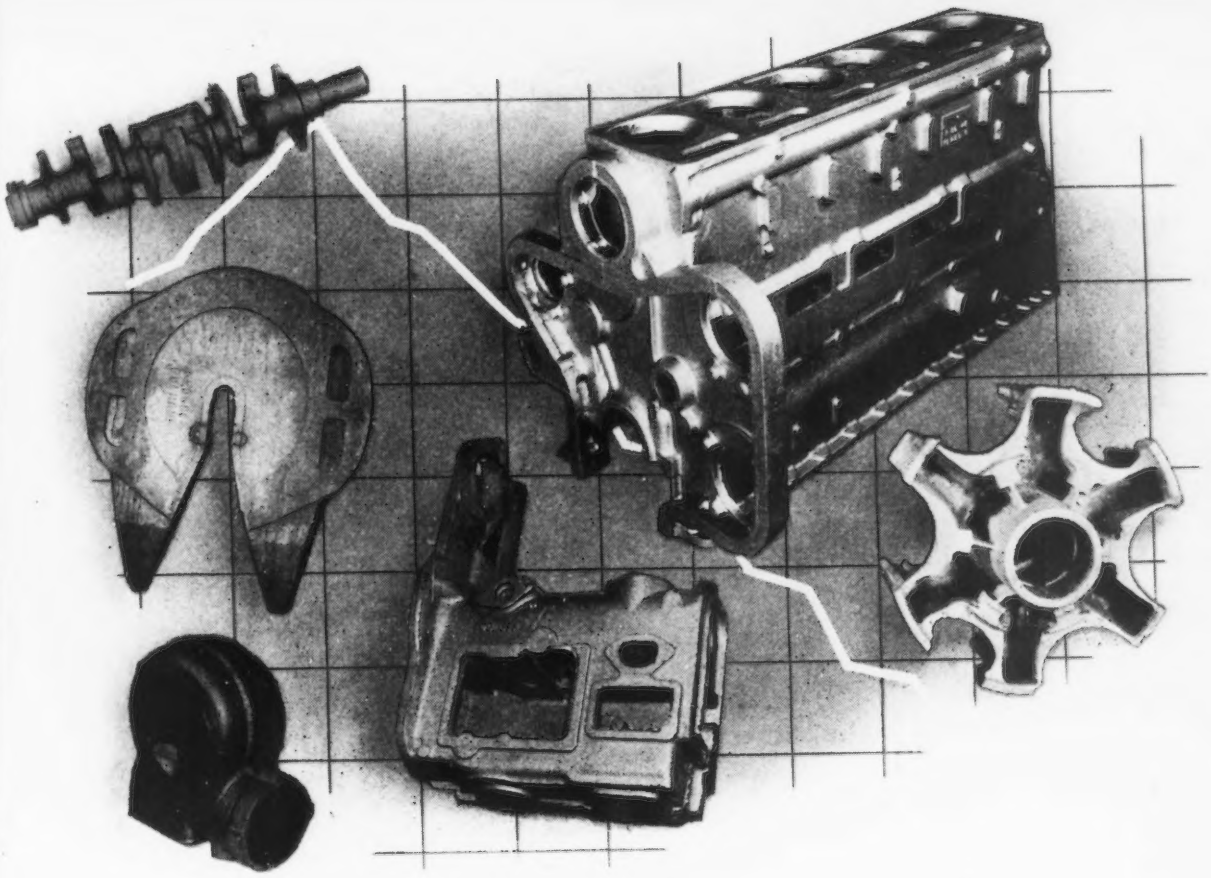
ELECTRODE COATINGS

Sir:

I would like to obtain one copy of the article entitled "Identifying the Constituents of Welding Electrode Coatings" by R. C. Vickery, which appeared in the issue of Apr. 19, 1945.

R. A. POMFRET
Materials Engineer

Bethlehem Steel Co.
Quincy 69, Mass.



cut the trend of rising costs with WHEELABRATORS

High Productivity keeps prices down . . . makes it possible for a wider consumption of goods . . . creates a prosperous, balanced economy.

With the average rate of production per man-hour now below pre-war levels progressive management today is thinking in terms of intensified mechanization to increase output, to lower unit costs, and to maintain profits.

Competitively the situation varies from plant to plant . . . with many already competing in, or fast approaching, a buyers' market. How soon you will be in that position depends upon conditions in your field. But you can't start too soon to overhaul production methods and equipment that even now may be keeping you from taking full advantage of today's opportunities.

A good starting place is right in the cleaning room, because that is where the production speed and cost savings of the airless Wheelabrator have been so successfully applied by more than 3500 plants . . . a record that is unapproached in the airless blast field.

American
WHEELABRATOR & EQUIPMENT CORP.
(FORMERLY AMERICAN FOUNDRY EQUIPMENT CO.)
510 S. Byrkit St., Mishawaka, Indiana

WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQUIPMENT

Industrial News Summary...

- **Steel Wage Problem To Be Tough**
- **Scrap Prices Advance Sharply**
- **Ingot Output Set at 79.0 Pct**

UNFORTUNATELY for steel consumers the labor outlook during the past week is changed but little from a year ago when the steel industry was definitely faced with a paralyzing strike. Although the chances of such a strike occurring in February are not as great as was the case a year ago, the prenegotiation statements on the part of labor and management appear to indicate a rough negotiating period.

While the United Steel Workers of America have not made known the specific wage demand which they will place before the industry in January, it is certain that it will be no small amount. Although Philip Murray and other union officials have termed the union action in making the proper notification for a steel strike as a routine one, a stalemate in wage negotiations up to the period when current contracts expire (Feb. 15) will find the strike vote taking on a far more serious aspect.

Observers who have taken the position that Mr. Murray's future actions would be dictated by the experience of John L. Lewis appear to be on the wrong track. According to past precedent the steel union has laid its plans without any influence from activities of the United Mine Workers. On such basis it can be expected that the outcome of steel negotiations will be entirely decided upon whatever counter-offer the steel union can wring from the industry. The answer to this situation will determine whether or not the nation is again to be tied up by a long steel strike.

While the secondary request of the union embodying various social security proposals is considered to be important to the union's prestige, it alone is not considered to be of sufficient importance to warrant a national strike if such demands are not fully met.

STEEL officials this week are privately pondering over the position into which they have been pushed. Having tasted the advantages of high operations and better financial return during several months of 1946, they naturally would like to see an uninterrupted year of steel production in 1947. The price they will probably be called upon to pay for this—a stiff advance in all steel prices—may be too high when measured by its ultimate result in probable loss of production at some subsequent time due to the overpricing of steel products.

Had it not been for the steel strike and the two coal strikes during this year, steel industry output could reasonably have been expected to reach 81 to 83 million tons of ingots. Instead of this figure, estimated output for this year indicates a total steel ingot production of approximately 65,900,000 tons. This experience indicates that strikes and the confusion in scheduling iron and steel-making programs before and after such shutdowns caused a loss of more than 16 million tons of steel ingots during this year.

ALTHOUGH steel firms continued this week to make further adjustments in some steel prices their steelmaking costs were again advanced by higher scrap prices. Late last week and early this week the exceptional prices which appeared early last week became general practice in all major scrap consuming areas. Furthermore, most markets had resumed the practice of scrap transactions on a delivered to consumer basis. Because of increases at Pittsburgh, Chicago and Philadelphia, THE IRON AGE scrap composite price advanced from $28.17 a gross ton to $31.83 a gross ton—an increase of $3.66 a ton.

Since OPA price controls were removed on iron and steel scrap, the price of heavy melting steel has advanced about $12.00 a ton, although in some instances the net advance has been about $9.50 a ton due to a previous practice of overgrading some materials. Scrap prices have now reached such a high point that a definite resistance is expected to set in which may be strengthened by a better flow of some grades from remote areas into major consuming localities.

Some steel producers in the past few days have made adjustments in the prices of certain products in order to bring them into line with past revisions on finished steel products. Alloy steel ingots have been advanced by some companies from $48.69 a gross ton to $52.00 a gross ton. Alloy steel billets have been advanced from $58.43 a gross ton to $61.00 a gross ton. Alloy steel bars have been marked up from 2.92¢ per 100 lb to 3.05¢ per 100 lb.

MAJOR producers making wire rods have posed a problem for manufacturers who turn this material into finished wire items by raising the price $5.00 a net ton. Some companies, especially smaller units, are now carrying prices on many steel products which are in excess of quotations announced by major steel firms. Because of demand outrunning supply there is little or no difficulty in obtaining these premium prices but the majority of tonnage moving is going at the prices quoted by the major steel companies.

Had it not been for the Christmas holiday, steel ingot output would probably have reached 91 pct of rated capacity this week. However, because many units closed their steelmaking departments for at least 24 hr during the Christmas period, steel ingot output this week is estimated at 79.0 pct of rated capacity compared with 85.0 pct last week. A sharp rebound to the 90-pct level is anticipated for next week. Furthermore, with the steel labor wage situation beginning to take on a more serious aspect, it can be expected that steel furnaces in the near future will be pushed to their utmost capacity.

• **STEEL WAGES**—Reflecting the high operating levels experienced during October, steel industry payrolls for that month set a new peacetime peak, which was only topped in two wartime months. The total payroll for October at $150,637,500 was almost 8 pct above September's payroll of $139,625,600. Average number of employees during the month amounted to 595,700, equalling the September postwar peak. The industry's wage earners worked an average of 40.3 hr per week during October, the highest rate this year, as compared with 37.5 hr for the preceding month. The average hourly wages of hourly, piecework or tonnage workers in the industry amounted to 134.1¢ during October, slightly below the September alltime high of 136.2¢ per hr, but well above the 119.6¢ average rate in the same month of 1945. Through the first 10 months of 1946, the steel industry had paid its workers $1,263,484,800 in wages, despite the adverse influence of strikes.

• **WEEKLY EARNINGS**—Preliminary estimates by the Bureau of Labor Statistics placed average weekly earnings in manufacturing industries during October at $45.83 or almost $5 above last October, but $1.50 below the January 1945 wartime peak.

• **AUTO EMPLOYMENT**—The automobile industry has taken the lead in employing the highest percentage of ex-servicemen according to a release by the Bureau of Labor Statistics. Of every 100 of the motor industry's personnel, 27 are World War II veterans compared to the U. S. industry average of 18 pct, the Bureau of Labor Statistics states.

• **CALLING THEM CLOSE**—At least one large sheet producer is asking that customers specify the sheet thickness in decimals of an inch rather than by gage. This permits them to collect the full price on tonnages shipped. The old practice often resulted in the necessity of billing over-gage sheets at the gage price specified on the order. Under that method the producers were unable to collect for the overage in weight, which was caused by the mill rolling on, or over, the high side of the tolerance.

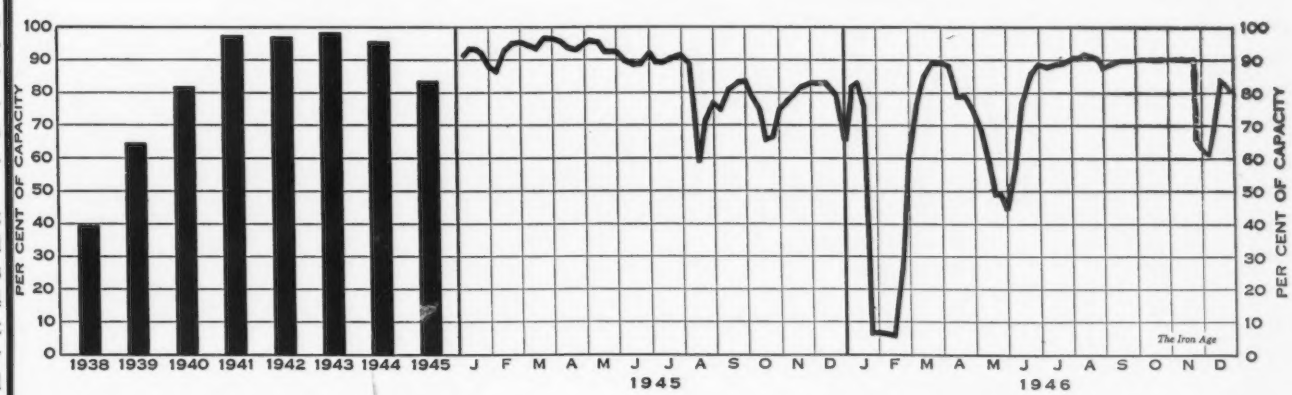
• **RISING INVENTORIES**—The value of inventories in all stages of fabrication held by manufacturers increased by more than $600 million during October, the Office of Business Economics, Dept. of Commerce, said recently. This continues unbroken the rise which started with the first of the year. At the end of October the total manufacturers' inventories were $19.5 billion. This is a preliminary figure based on telegraphic reports from a representative group of firms. October was the fourth consecutive month in which the inventory values reached new high levels. Less than half of the increase in inventories which occurred during October was in the durable goods industries.

• **STRIKE LOSSES**—The Bureau of Labor Statistics indicates that strikes during the first 10 months of 1946 involved 4,095,000 workers, indicating that 1946 will establish an all-time record. Mandays lost due to strikes and idleness through October were estimated at 102,525,000 or 1.6 pct of the total available working time of the country's workers.

• **INDIVIDUAL INCOME**—Total income payments of individuals reached a record high of $14,763,000,000 in October according to a recent Commerce Dept. report. Salaries and wages during October totalled $9,243,000,000 against $9,144,000,000 in September. October income payments to individuals were equivalent to an annual rate of $172,000,000,000. This may be compared with an actual total of $160,800,000,000 for 1945.

• **BRITISH STEEL OUTPUT**—Steel production figures in the United Kingdom during November were the highest reached in any month this year, totaling 1,181,600 tons. Output amounted to 1,108,800 tons in the same month last year, and 965,200 in November 1938. Pig iron production, which was slightly reduced during November this year by a temporary interruption at one of the works, totaled 689,400 tons, compared with 672,000 tons for the same month last year.

Steel Ingot Production by Districts and Per Cent of Capacity



Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
December 17...	93.5	86.5	77.5	85.0	95.0	96.0*	85.0	80.0	107.0	67.0	95.4	80.0	88.0	85.0
December 24...	82.0	75.5	73.0	80.5	82.5	92.5	80.0	95.0	94.5	68.0	83.5	70.0	76.5	79.0

* Revised.

A WINDJAMMER *Goes Modern*

WITH DIESELS AND BRONZE BOLTS

WHEN the glorious old sailing vessel "Foz Do Douro" recently made a record crossing from Lisbon to Vera Cruz, it was with twin 650 hp. Fairbanks-Morse Marine Diesels in her new engine room . . at the mercy of the wind no longer.

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This study in contrasts between the old and the new may be a cue to a similar application in your industry. Wherever there is danger of rust or corrosion consult a Harper engineer. The original installation of non-rusting, non-corroding fastenings pays for itself in reduced maintenance and elimination of breakdown.

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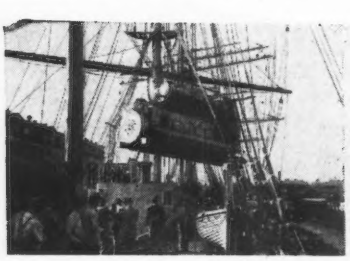

One of the twin 650 Hp. Fairbanks-Morse Marine Diesels . . . equipped with Harper Bronze Bolts . . . goes into the new engine room of the 54 year old sailing vessel.

BRASS
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HARPER
Everlasting Fastenings
Chicago

C-I New Extra Price Card May Set Pattern For Industry

o o o

By D. I. BROWN
Chicago Regional Editor

o o o

ROLLING AGAIN: *A dolomite thrower goes to work between heats on an open-hearth in the Carnegie-Illinois Homestead works as the nation's steel mills renew their drive to push production to or above prestrike levels.*

Chicago

• • • **The new extra price** card on hot-rolled carbon bars dated Dec. 16, 1946, published by Carnegie-Illinois Steel Corp., is expected to set the pattern for the rest of the industry. This is the first important change in their extras since Jan. 6, 1941, and represents the increased cost of production of many of the items made in recent years which were sold at unprofitable prices. Many of the increases are major, and they are reported to be stiffer than expected by the trade. The price card is of such nature that some experts report they are facing a general re-education program on prices.

The size extras were increased on rounds, squares and round cornered squares in all sizes below 2⅛ in. Over 2⅛ in. the extras remain the same. The industry has long contended that small bars were ridiculously low and the new sheet substantiates that claim. The former practice of using the size range of 47/64 to 1½ in. as "base" has been dropped and there are now extras over and above the new base price of $2.60 for any size ordered. The smaller the size the more the prices were raised with ¼ in. size up to $4 a ton on extra for size alone. The 9/32 in. size extra is up $3 a ton, etc. Hexagon extras were unchanged, except in the ¾ to 1 9/16 in. size range. Certain sizes of half ovals and half rounds are up $4 a net ton.

The size extras, on square and round edge flats, break at the same dimensions, but sizes under ⅜ in. in width have been added to the new price card. The size extras on this product were increased on most of the items. Again, there are no sizes of flats which will be furnished under the new prices at the "base" price. As an example, a standard flat, 1 to ⅜ in. in width and 1 to 13/16 in. in thickness now carries the extra of 15¢ per cwt or $3 a ton. This size was formerly furnished free of a size extra. Special edge extras on all flats remain the same.

Quantity extras were not changed with the extras starting at 20 tons and under, as was the former practice. Straightening extras have been condensed. Commercial machine straightening, ⅛ in. in 5 ft, is now lumped under one classification covering all bars and bar shapes with no separate list for rounds and squares or hexagons and octagons. The former table used for flats on a weight per foot basis is employed in the new method with the price up $2 a ton right down the old list to sizes over 2 lb per ft. On weights over 2 lb per ft, the extra price increase is only $1 a ton.

Extras for standard cutting will not be charged, provided the buyer accepts all random lengths, or all in multiples of not over 5 ft or in 10 pct random shorts, with no lengths more restricted than certain minimums. These minimums have been considerably revised. The standard cutting to specified lengths stops at 5 ft and under and is identical to the table used in AISI Manual No. 10 covering alloy bars. Special cutting and precision cutting of one or both ends will be done only on machine straightened bars and the appropriate straightening extra will be added to the price.

Treatment and finish extras vary with the type of specifications. Ordinary annealing and normalizing are now on separate extras but the annealing extra has been increased $3 a ton and the new extra on both treatments does not include machine straightening. Heat treating, or quenching and drawing extras remain $30 a ton, but the new price does not include machine straightening as did the old price. The oiling and liming extras have not been changed. Pickling extras are now on a weight per foot basis with a $3 per ton extra for all bars weighing over 2½ lb per ft, and $10 per ton on all bars weighing ½ lb per ft and under. Intermediate weights are included in the price list.

Packaging and loading extras appear for the first time. Bundle weights, under 500 lb, now cost

$5 per ton extra. Lift weights, over 5 net tons, are free of extras but charges will be made for lift weights under 5 net tons. Certain color marking charges are now in effect and published extras are now accessible for stamping of heat numbers or symbols on the ends of individual bars on certain minimum sizes. The old practice of charging for the four above new extras appearing in the book was based on standard or nonstandard practice. This method was rather haphazard and has now been made much more exact.

Quality extras are also covered in the new extra price list. Special bar quality is $3 per ton, but will not apply on killed steel. Additional restrictive requirements are chargeable on both killed and nonkilled grades, however. Chemical requirement extras are somewhat different in the new list as the ranges have been modified. On the .07 maximum carbon, openhearth types, the carbon extra is now $2 a ton. The top mean of the carbon range of the grade that formerly fell in the .08 to .25 carbon range for openhearth steels is now .09 to .28 and is free of any extra. Generally speaking, restricted chemical requirement extras have been doubled for the elements carbon, manganese, sulful and phosphorus for bessemer steels. Restricted range extras for some of the elements in openhearth steels have been more than doubled.

Extras for restricted physical test requirements were not increased in the new list. Closer than standard tolerance extras were, however, given a good boost. These tolerances are still figured on the old basis, but the new extra is $15 a ton instead of $5 a ton.

All in all carbon steels, even the garden variety, is going to cost more money and the customers, who over the years kept demanding better than standard products from the mills, are finally going to be charged accordingly. For some weeks it has been noticed that there was a decided trend by the trade to stick to standard steels of standard tolerances and attempt in every way to order steel free from extras.

Under the new system, there is very little chance of consumers escaping chargeable extras. The new prices reflect the increased cost in the making, shaping and treating of steel which has occurred since 1941, plus the additional money spent in meeting more exacting requirements which are continually being specified by the trade.

U. S. Steel Corp. Buys Another Plant in Its West Coast Expansion

San Francisco

• • • **Columbia Steel Co.** has announced the purchase of all of the fixed assets and properties of the Consolidated Steel Corp. of Los Angeles and its subsidiaries subject to approval by Consolidated shareholders.

Alden G. Roach, president of Consolidated, states that his board of directors recently accepted Columbia's offer of $8,293,319 subject to the will of shareholders.

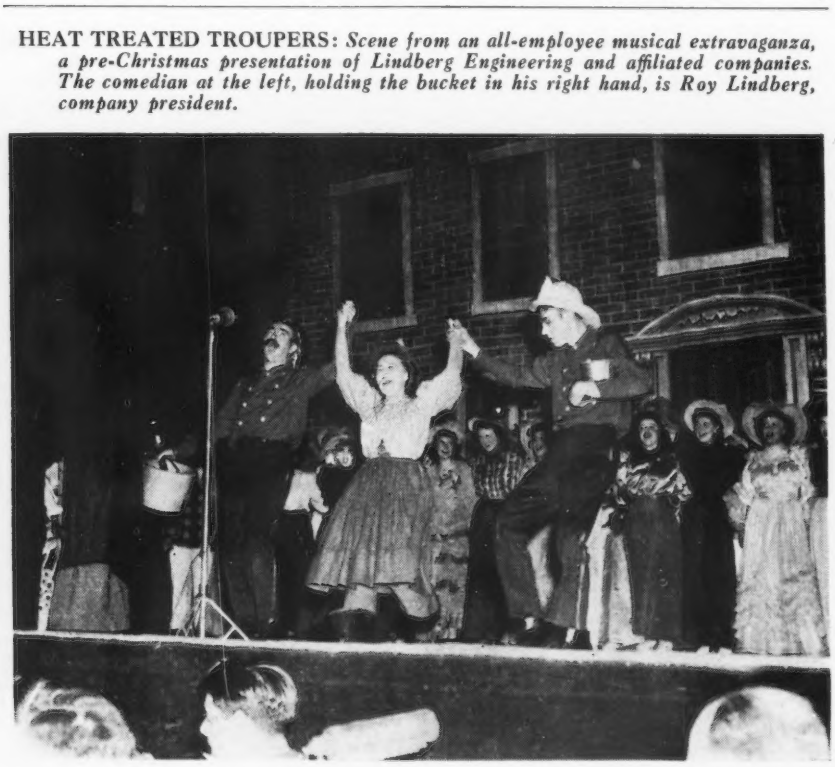
Consolidated as a corporation is to be dissolved and a modification of the purchase price may be made for assets acquired between August 1946 and the closing date of sale, and in addition Consolidated will be paid for inventories and miscellaneous assets. Consolidated will retain all cash government contracts and claims not related to operations.

W. A. Ross, president of Columbia Steel, states that acquisition of Consolidated will provide a major outlet for steel products produced at the plant of Geneva Steel Co., another U. S. Steel Corp. subsidiary. The acquisition of Consolidated will give Columbia its only steel fabrication plants in the West with the exception of the Drum plant of U. S. Steel Products Co. at Los Angeles and Alameda, Calif.

In 1945, Consolidated Steel expanded its activities with the purchase of Western Pipe and Steel Co., large plate and structural fabricators and shipbuilders with plants at Los Angeles, San Francisco, Berkeley and Fresno. Consolidated also has a large shipbuilding operation at Orange, Texas and is engaged in ship repair and dock construction in the Pacific.

Gross income of Consolidated on work performed for the fiscal year ended Aug. 31, 1945 was slightly over $300 million. The purchase of Western Pipe and Steel required a cash outlay of $6,217,363.

HEAT TREATED TROUPERS: *Scene from an all-employee musical extravaganza, a pre-Christmas presentation of Lindberg Engineering and affiliated companies. The comedian at the left, holding the bucket in his right hand, is Roy Lindberg, company president.*



Exporters Get Leeway In Seeking Benefits In Trade Agreements

Washington

• • • **Briefs of American** manufacturers and exporters asking for benefits in the trade agreements next spring need not be confined to requests for reductions in foreign tariffs but may refer also to other barriers such as quotas, allotment of exchange or discriminatory treatment by state monopolies.

In making this announcement, the Office of International Trade, Dept. of Commerce, said that briefs which OIT asked to be filed with the Committee for Reciprocity Information by Dec. 21, may be supplemented by verbal testimony at the committee hearings, which begin Jan. 21 in the Commerce building auditorium. The Dept. of Commerce suggested that interested parties who may have been unable to prepare complete information before the Dec. 21 deadline submit briefs making their general interest known, including such information as they may have available and supplement that information in verbal testimony at the January hearings.

Clarification of the extent of requests for reduction or elimination of foreign barriers, OIT said, was necessary because inquiries had revealed misunderstanding in some trade circles as to the scope of the proposed negotiations and the requirements for those wishing to testify at the hearings.

Negotiations of trade agreements with the following 18 countries will begin next April, the State Dept. has announced: Australia, Belgium, Brazil, Canada, Chile, China, Cuba, Czechoslovakia, France, India, Lebanon (Syro-Lebanese Customs Union), Luxembourg, Netherlands, New Zealand, Norway, Union of South Africa, Union of Soviet Socialist Republics, United Kingdom, and the colonies of these nations. OIT called attention to the fact that requests by American business men may include commodities they wish to export to the British, French, Netherlands, and Belgian Colonies, as well as to the respective mother countries.

Certain rules regarding submission of briefs have been published by the Committee for Reciprocity Information, Tariff Commission Bldg., Washington 25, D. C. They include the requirement that 10 copies of each brief be submitted; one of these must be sworn to. A pamphlet containing these rules, as well as one containing suggestions for use in preparation of briefs, may be obtained from the Committee. It was pointed out that all requests for appearances before the Committee must be accompanied by briefs.

New Price Schedule Is Now in Effect On Export Steel Products

New York

• • • **Export prices** for carbon steel products have recently been revised. It is reported that the following prices are being quoted by U. S. Steel Export Co., f. o. b. mill, with freight included to New York, Philadelphia and Baltimore. These prices will, it is said, be adjusted to seller's prices in effect at the time of shipment from the mill. All prices are per 100 lb unless otherwise noted.

Plates	$3.25 per 100 lbs.
Structural shapes	3.00 per 100 lbs.
Merchant bars	3.25 per 100 lbs.
Reinforcing bars	3.10 per 100 lbs.
Sheet piling	3.30 per 100 lbs.
Hot-rolled sheets, 10 gage	3.18 per 100 lbs.
Hot-rolled sheets, 24 gage	4.08 per 100 lbs.
Cold-rolled sheets—mill run, 17 gage, 2-ton packages	4.08 per 100 lbs.
Galvanized sheets, 24 gage	5.05 per 100 lbs.
Hot-rolled strip	3.00 per 100 lbs.
Cold-rolled strip	3.70 per 100 lbs.
Tinplate (Coke 107-lb) per base box	6.60
Bright nail wire	3.55 per 100 lbs.
Black annealed wire	4.00 per 100 lbs.
Galvanized plain wire	4.35 per 100 lbs.
Galvanized barbed wire, 80-rod spool,	
Lyman 4-Pt., 5-in.	3.95
Glidden 2-Pt., 4-in.	3.62
Wire Nails	4.27 per 100 lbs.
Bright staples	5.07 per 100 lbs.
Galvanized staples	5.57 per 100 lbs.
Ingots, per gross ton	44.00
Billets, blooms, slabs, rerolling quality, per gross ton	52.00
Billets, blooms, slabs, forging quality, per gross ton	60.00
Wire rods—in coils	66.65
Skelp	2.25 per 100 lbs.
Standard rails, over 60-lb, per net ton	62.65
Light rails, 60-lb and lighter, per net ton	67.00
Girder rails, per net ton	69.25
American Standard pipe T & C	Discount, per cent
1 to 3 in., Black buttweld	56½
1 to 3 in., Galvanized buttweld	45½
3½ to 6 in., Black seamless	57
3½ to 6 in., Galvanized seamless	45

HARD TO GET: *Forty two of these scarce machines were shipped to the Russian states of Byelorussia and the Ukraine. Caterpillar Tractor Co. has been only partially successful in its eefforts to keep these badly needed tractors at home. An industry protest to CPA opposing the orders given the manufacturers for UNRRA resulted in a* 50-*pct reduction in original quotas, but it is expected that CPA will still draw off more than* 7000 *track type tractors from domestic supply lines.*

VA to Receive Surplus Hand Tools from WAA

Washington

• • • **About one and** a half million dollars' worth of surplus hand tools have been transferred to the Veterans Administration for use in its apprentice training and rehabilitation programs, War Assets Administration announced recently.

The tools will be distributed free to G.I.'s in hospitals with prevocational training programs requiring tools for skills such as watchmaking or leathercraft, VA officials said. They will also be given to veteran-apprentices training to be machinists, painters, carpenters, metalworkers, and skilled workers in similar trades.

The bulk of handtools transferred under this program were located in the Lordstown Ordnance Depot near Warren, Ohio. The balance was taken from smaller lots located in Brooklyn, N. Y., Belle Meade, and Bayonne, N. J.

Included among the hand tools are paint and varnish brushes of all types, jimmy bars, bits, tool boxes, calipers, chisels, C-clamps, dividers, drills, files, gages, hammers, soldering irons, putty knives, pliers, punches, screw drivers, cribers, shears, saws, T-squares, torches, trowels and wrenches of all sizes and shapes.

WAA Approves Sale Of Three War Plants

Washington

• • • **The Pittsburgh Steel** Co., Pittsburgh, has purchased from WAA, for $361,996.30, industrial facilities which the company operated during the war.

The property, originally constructed to increase the production of cold-drawn seamless tubing, WAA said, will be operated to produce the same material. The land area is composed of seven rectangular parcels and production facilities are "scrambled" with those of the operating lessee.

WAA has also approved the sale of a Navy-sponsored war plant at West Allis, Wis., to the Allis-Chalmers Mfg. Co., wartime operator, for $1,286,256 cash on closing. The purchaser, WAA said, intends to employ 3000 persons in the production of electrical switchgear and electronic induction heating equipment.

The Waterbury Tool Div. of Vickers, Inc., Waterbury, Conn., has purchased from WAA for $263,788 Building No. 2 and building installations of the Navy-sponsored hydraulic transmission plant which the purchaser operated during the war.

Container Production Falls Short of Demand

Washington

• • • **Hit heavily by the** steel strike, despite the upward trend in production of steel containers during the first half of 1946, it is indicated that the industry would fall far short of meeting requirements for the year, according to preliminary estimates by the Commerce Dept.

Capacity of the present 128 operating plants varies between 1.2 and 1.4 million tons, in terms of steel consumption. Only 850,000 tons were available in 1945 and the industry was able to produce only 22.2 million of 20-gage or heavier containers and 10 million of the lighter than 20-gage types.

As a result, the industry began the year with a backlog of unfilled orders for 5.3 million heavy and 1.7 million light type containers. In addition, orders were on file for 16 million 1-to-12 gal. packages, kegs and pails.

Lend-Lease Shipments Of Iron, Steel Items Top 15.6 Million Tons

Washington

• • • **Direct lend-lease** shipments of iron and steel products from the United States aggregated 15,681,000 net tons according to the former Metals and Minerals Unit, now the Machinery and Metals Section, Dept. of Commerce. Of this total, 7,478,000 tons or about 50 pct went to the United Kingdom. Next in importance as recipient of these shipments was Russia which took 2,999,000 tons India ranked third with 1,375,000 tons. The lend-lease period extended from March 31, 1941 to Sept. 2, 1945.

The Machinery and Metals Section 1945 figures on all steel exports have not been completed, but the 1941-44 totals show that all exports or iron and steel in these five years were 27,612,000 tons of which 13,790,000 tons, valued at $1,093,999, was lend-lease material.

The value of the lend-lease shipments by countries during 1941-44 and their percentage of total shipments follow:

	Value (In Thousands of Dollars)	Percentage of Total Shipments
Canada	$4,915	1.9
United Kingdom..	455,403	74.3
USSR	344,172	98.9
Iraq	4,907	90.7
India	100,042	89.6
Australia ...	52,973	86.3
Iran	14,084	69.9
New Zealand	24,541	85.6
Egypt	63,462	90.3
Union of South Africa	29,500	45.9

United States Lend-Lease Exports of Iron and Steel Products, 1941-45
(In Thousands of Short Tons)

Country of Destination	1941	1942	1943	1944	1945	Total 1941-45
Canada	5	24	56	12	*	97
United Kingdom	762	2,356	2,859	1,470	31	7,478
USSR	2	684	680	885	748	2,999
Iraq	—	55	10	3	3	71
India	—	338	457	354	226	1,375
Australia	14	159	127	158	118	576
Iran	—	91	41	49	44	225
New Zealand	8	110	111	57	21	307
Egypt	47	395	194	175	29	840
Union of South Africa	—	113	131	99	1	344
All Other	21	216	253	209	670	1,369
Total	859	4,541	4,919	3,471	1,891	15,681

* Less than unit indicated.

Italian Steel From UNRRA Coal

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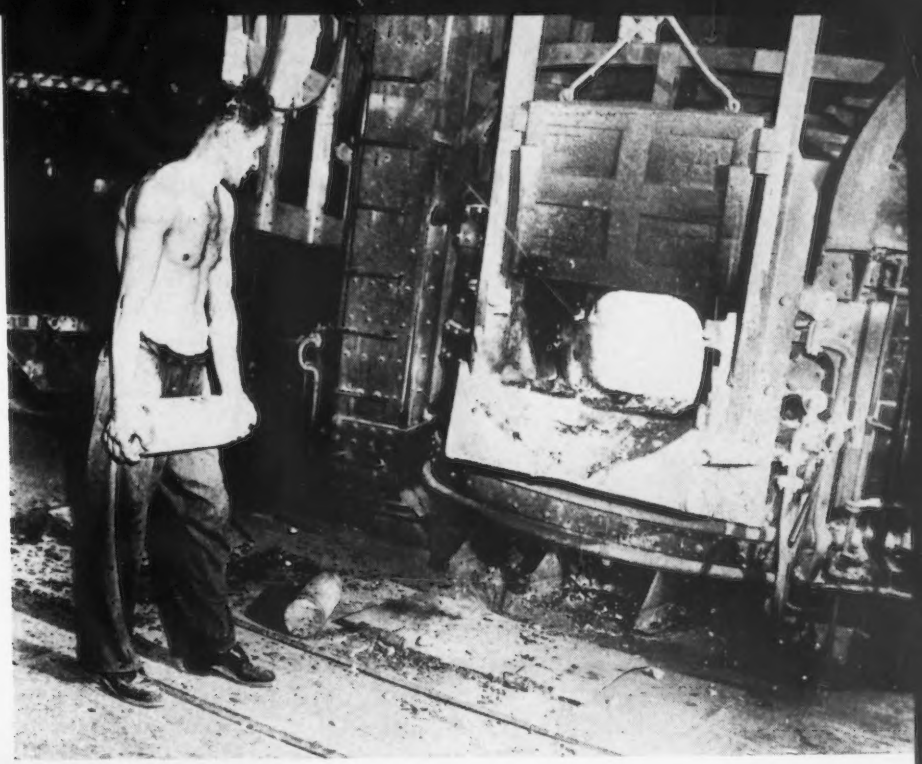
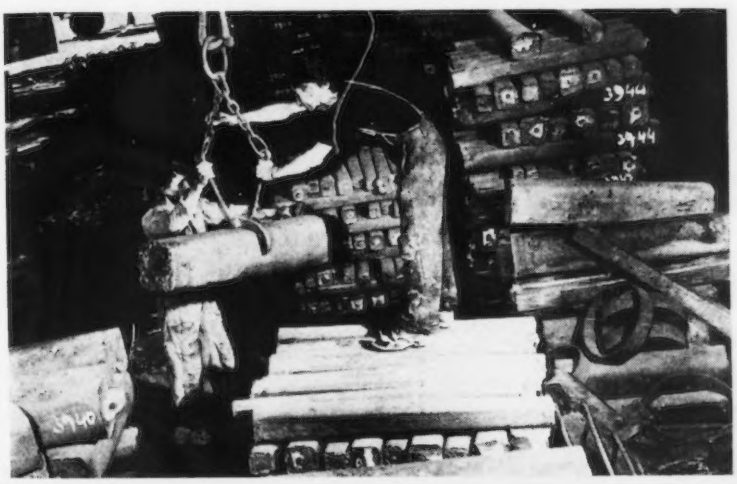


BELOW

SCENE at the Ilva steel plant in Venice where steel ingots are being loaded for shipment to rebuild Italy's war torn industries.



ABOVE

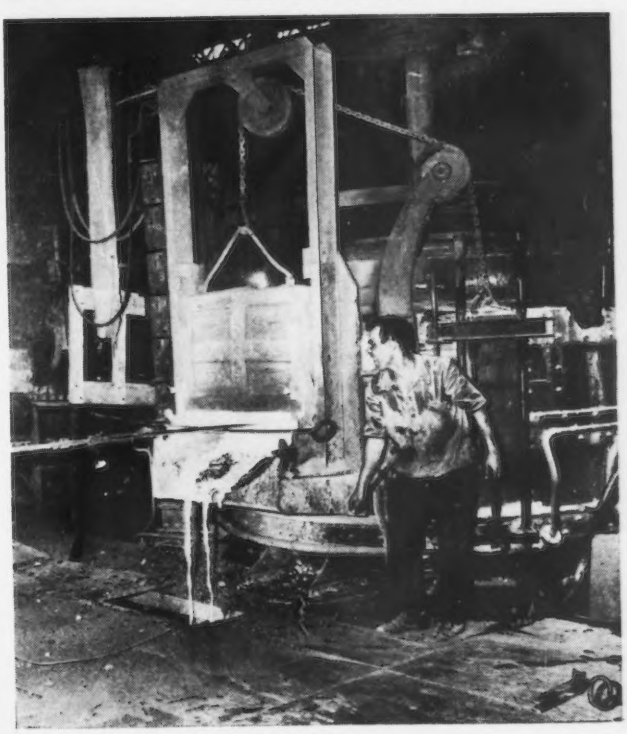
THE "swords into ploughshares" story again as a worker at the Ilva works charges an empty artillery shell into an electric furnace, where UNRRA coal is helping produce 1900 tons of steel monthly.

LOWER LEFT

UNDER construction in an Italian plant is part of a turbine which will help revive Italian industry. All photos on this page are by G. D. Boria, through the courtesy of UNRRA.

BELOW

SKIMMING an electric arc furnace at the Venetian Ilva works appears to be causing this worker considerable anxiety, if his facial expression is any indication of his mental state.



Canada Raises Auto Price Ceilings Other Increases Reported Imminent

Toronto

• • • **While the Wartime Prices** and Trade Board continues to maintain controls on raw materials and manufactured articles, there has been some easing in Canadian price ceilings recently and producers have been permitted to increase prices of certain finished products to meet the substantially higher costs of labor and raw materials. Announcement is made by WTPB regarding an increase of 10 pct in the consumer price of new Canadian made automobiles and a 7 pct boost in price of commercial vehicles, effective Dec. 17. Companies permitted to make price adjustments are Ford Motor Co. of Canada, General Motors Corp. of Canada and the Chrysler Co. of Canada.

The Board officials stated that the increase in price was allowed following demonstration by the three companies of the effect of higher production costs. Board officials stated that despite increased production costs the permitted price increase has been held to a point where the price of domestically produced cars compares favorably with that of imported cars. A Canadian who imports a standard model from the United States would be obliged to pay upwards of $200 more than for the same Canadian made car under the new domestic price ceiling.

From reliable sources it is learned that WTPB is considering further action early in the New Year in connection with the lifting of price ceilings on a wider range of consumer goods, although a safety valve will be maintained to head off skyrocketing prices which might generally disrupt conditions throughout Canada. It is understood that for the immediate future lifting of ceiling prices will be confined largely to boosts of around 10 pct.

While rumors indicate that there may be further lifting in the ceiling prices on iron and steel, scrap and various nonferrous metals early in 1947, no confirmation has been forthcoming from Government sources. Previous to the war most Canadian steel prices were based on Pittsburg, plus duty, freight and exchange, whereas today domestic prices are governed by government ceiling. Thus while Canadian produced steel sheets have a base price of $3.05 per 100 lb, the U. S. price is $2.50 but by adding duty of 20 pct, the rate on lighter gages, freight rates of 50¢ per 100 lb and exchange at one half of one pct, U. S. prices on sheets have a range of approximately 50¢ per 100 lb above the Canadian price.

Pig iron prices in Canada, currently quoted at $30.50 per gross ton for base grade delivered Toronto, are 50¢ higher than Buffalo, but by adding duty, freight and exchange, iron imported and delivered to Toronto from Buffalo, would cost a Canadian consumer upwards of $5 per ton above the domestic level. The ceiling price on scrap iron and steel in Canada, shows even a wider spread as compared with those prevailing across the line. For No. 1 heavy melting steel, the Canadian price delivered to consumer Hamilton is $17.50 per gross ton, which compares with approximately $28.50 Buffalo, thus a Canadian buying scrap in Buffalo for delivery at Hamilton not only would be faced with the higher rate prevailing in the U. S., but would have to pay the additional freight and other charges which would bring the delivered price here at least $11 per ton higher than that paid by Buffalo melters. With this wide spread and the fact that finished products in Canada remain under ceiling control, there is little prospect of any large inpouring of scrap from across the line under existing conditions.

The lifting of ceiling prices on automobiles by 10 pct to offset the higher costs of labor and raw materials, appears to be the thin edge of the wedge that will be followed by similar boosts in most domestic steel prices as well as on a wider variety of finished products, early in the coming year.

Kaiser Increases Price Of Plates, Shapes And Bars by $7 Net Ton

San Francisco

• • • **Business men** of the West Coast are trying to assay the implications of the statements of Kaiser Co., Inc. which accompanied announcement of its $7 per net ton price increase last week on plates, structural shapes and carbon bars at Pacific Coast basing points.

The Kaiser statement declared: "The increase has been made to offset increased costs of steel manufacturing and to correct inequities in present pricing policies affecting the steel consumers. The exclusive producer of these basic steel products is entitled to a reasonable return on his investment. The previous pricing policies established by some producers, who largely control and profit from the manufacture of highly finished and fabricated steel products, have prevented a reasonable profit on the three basic products—structural shapes, carbon bars and plates. Many producers have just recently advanced prices on the highly finished and fabricated steel products without a corresponding increase in the three basic products.

"It was economically possible for some of the major producers to establish a low price on basic products because they were in a position to recover on the highly finished products. The Kaiser Co., Inc., iron and steel division, will at some later period fully disclose to the public all the facts surrounding the advantages of the Fontana Steel plant to the people in the West. Kaiser Co., Inc., recognizes that the price policy on all steel products seriously affects every single individual and that such policy must be equitable to all concerned."

Offer Aluminum Plant

Washington

• • • **Bids have been asked** by WAA for the purchase of the $24 million Aluminum Co. of America 129-acre aluminum reduction plant at Torrance, Calif., either as a whole or in part. The plant is completely equipped to produce 160 million lb of aluminum and 28,800 tons of carbon electrodes per year.

Weekly Gallup Polls . . .

Public in Survey Votes Against Destroying Atom Bomb

Princeton, N. J.

• • • **Russian proposals** that we stop making atom bombs and destroy those we have on hand meet with a chilly reception from the American public, according to George Gallup, director, American Institute of Public Opinion.

Distrust of Russia has been one of the major reasons for this sentiment.

However, it may begin to change as a result of the action taken recently by Soviet Foreign Minister V. M. Molotov. He publicly endorsed international inspection of armaments and weapons, thus removing one of the major stumbling blocks to agreement between the United States and Russia over international control of atomic weapons.

Up until he took this action, the average American did not fully trust Russia's intentions concerning disarmament. He did not believe that our stripping ourselves of atom bombs would substantially alter Russia's position or make her more likely to cooperate in setting up international atomic control.

Whether these views on the part of the American people are right or wrong, they appeared to be held with considerable tenacity at the time the institute poll was taken during the last 2 weeks of November.

A series of surveys was conducted by the institute among a scientifically-selected cross-section of the voting population in all the 48 states.

The first question put to the voters was:

"Do you think the United States should stop making atom bombs and destroy all those we now have?"

The vote:

	Pct
Yes	21
No	72
No opinion	7

As an experiment, a companion survey was conducted on this same issue with the question worded to include one of the arguments in favor of ceasing to make bombs. This survey was conducted among a separate but comparable cross-section and the wording was as follows:

"Do you think that the United States should stop making atom bombs and destroy those already made to prove our good intentions in asking for international control of atomic bombs?"

The response to that question showed very little change in the "yes" vote as compared to the other question. There was some decline in the "no" vote, and an increase in the number without opinion.

	Pct
Yes	19
Yes, qualified, (if other countries do likewise," etc.)	5
No	65
No opinion	11

The general distrust of Russia which existed in connection with atomic disarmament at the time the poll was taken can be seen from the results of two other questions in the surveys.

The first of these was as follows:

"Suppose the United States stopped making atom bombs and destroyed those already made. Do you think Russia would then agree to let a United Nations Committee check to see that Russia does not make atom bombs?"

The vote:

	Pct
Yes	13
No	72
No opinion	15

The next survey question was:

"Do you believe that this (ceasing to make bombs and destroying those already made) would help in bringing about an agreement with Russia regarding international control of atomic bombs?"

The vote:

	Pct
Yes	28
No	52
No opinion	20

There have been signs in recent weeks that American attitudes toward Russia have softened somewhat.

A survey made by the Iowa poll among residents of that state found that a majority think Russia has been trying to be more friendly toward the United States in recent weeks. The Iowa poll asked, "During the last month or 6 weeks have you felt that Russia was trying to be more friendly toward the United States?"

The vote showed 56 pct saying yes, 30 pct no, and 14 pct expressing no opinion.

Whether this attitude is found general throughout the country, future nationwide surveys by the institute will determine.

The Baruch Plan for atom control contains a provision that at a stage to be determined in the setting up of an adequate control system, the United States would stop manufacturing atomic bombs and dispose of all existing bombs

Our temporary monopoly of atomic energy would then be transformed into a permanent monopoly of the international Atomic Development Authority created by the United Nations.

•

Sentiment Against Severing Relations With Franco Spain Is Found in Nationwide Poll

o o o

• • • **While the American people** have no love for the Spanish dictator Franco, the weight of public opinion at present is against breaking off trade or diplomatic relations with Spain.

The Political and Security Committee of the General Assembly of the UN voted a reprimand of the Franco regime by approving the recall of ambassadors to Spain. This action is of course short of a break in diplomatic relations as originally proposed.

A reflection of how the American public views such a move is shown in a nationwide test conducted by the institute on the following question:

"Do you think the member countries of the United Nations should or should not break off trade and political relations with Spain?"

(CONTINUED ON PAGE 138)

Old Line Swedish Steel Companies Planning Expansions

Stockholm

By JACK R. HIGHT
European Editor

o o o

• • • **Long established** Swedish producers of special steels are planning modernization and expansion programs that will reduce labor consumption and expand output throughout the industry by about 40 pct. The shortage of imports formerly obtained from Germany and the serious national labor shortage are prompting the government to encourage increased steel production.

Much of the government pressure is directed toward revising the traditional product line of Swedish mills, expanding production of tubes, wire rods and thin sheets as much as possible. These items were largely imported before the last war, but today Germany is unable to export, and Belgium, France and Luxemburg cannot well afford to supply Swedish needs. Approximately 100,000 tons more of these items would have about satisfied Sweden's 1946 needs.

In recent months some assistance has been obtained from American shipments, but these tonnages have been at a price higher than Sweden likes to pay. Eastern American mills have been unable to furnish supplies for the Scandinavian market, and the shipments have been arriving from the Far West, adding to freight costs. There have been large orders which the Swedish industry has been unable to place, but most of the material which actually went on mill books has been delivered.

Imports which have been received in 1946 have come from Belgium and Luxemburg, United States, Britain, Czechoslovakia and France, in the order named. Imports for 1946 will total about 400,000 tons, not including pig iron, or possibly slightly more. Principal hopes for the arrival of substantial tonnages during 1947 are tied up in trade agreements with the Belgian-Luxemburg customs union and with Czechoslovakia. The agreement with Belgium which is in operation at present is considered here to be a good one, meaning primarily that the bartering of iron ore for steel resulted in the steel's arrival at a fairly low price. The Belgians regret finding themselves in a position of underselling the competition in a seller's market, but the situation seems to have been unavoidable. The imports from Czechoslovakia on the other hand are at a higher price than should be necessary because of excessive freight costs.

It appears that Swedish dependency upon the United States for supplies of tinplate will continue indefinitely, as there is no concrete plan at present for the construction of tinplate capacity. Studies have been made, and some producers are interested, but no program has been drawn up. Allocations which are made for tinplate from the United States have been shipped regularly, but Sweden rather regrets the restriction that the tinplate can only be used for the food industry.

Aside from the full-fledged participation in steel business in the north at Norbotten, the Swedish Government is moving away from control of the steel business, although many restrictions still exist. A government commission still deals with supplies of materials for the industry, as well as their allocations, but as specific products become freely available in the open market the controls are dropped. Industry sources feel that price controls will be removed within the next year.

Detailed information as to the specific nature of modernization work to be done by the industry is a little hard to obtain, as there is no central body with information which is available. The powerful Jungkontoret, or Ironmasters' Assn., which was founded in 1747, remains a dormant, secretive giant as far as this correspondent is concerned. Indications from individual firms, however, suffice to give a fair idea of the scope of new construction.

Aside from the presumably temporary controls applied during the war, the Ironmasters' Assn. through its subsidiary and affiliated bodies controls most of the policies of the Swedish steel industry. The association carries on negotiations with the workers' unions to establish a national pattern for conditions of labor, negotiates with the government in matters of allocations and priorities, maintains its own technical research organization, and through a subsidiary body dictates prices.

Probably the most important phase of the construction work sounds strange to the American ear, but is commonplace here in Sweden. To beat the labor shortage, most of the firms are planning the construction of hundreds of homes for their working people, or more properly for the people they hope to get. Approached from the standpoint of the individual steel company, the technique is sure fire. Talk endlessly if you will about the manpower supply being

UDDEHOLM EMPIRE: SHORES OF LAKE VANERN, SWEDEN

Reading up from the left bottom:
Skoghall, Uddeholm paper pulp mill.
Karlstad, beginning of Uddeholm railway.
Munkfors, cold-rolled strip and cold-drawn wire mills.
Skymnas, Forshult, Krakerud, Skoga — Uddeholm power stations.
Uddeholm, central offices.
Hagfors, tool steel, bars and sections, hot-rolled strip, stainless bars.
Taberg, Nordmark, Finnmossen, Langban, Persberg — Uddeholm ore mines.
Nykroppa, carbon steel of commercial grades.
Blombacka, wire products.
Storfors, tubes.
Degerfors, sheet and plate in subsidiary company.

UFB
KNON
NAIN
MALTA
SKOGA
UDDEHOLM
STJERN
HAGFORS
RÅDA
MOTJÄRNSHYTTAN
LÅNGBAN
FORSHULT
TABERG
NORDMARK
FINNMOSSEN
SKYMNAS
PERSBERG
FILIPSTAD
MUNKFORS
BLOMBACKA
NYKROPPA
STORFORS
KARLSTAD
ALSTER
LUNDSBERG
KRISTINEHAMN
SKOGHALL
DEGERFORS
VÄNERN

exhausted, when there are a hundred modern homes awaiting them the workmen appear from somewhere.

It is possible that by fostering this competition to build houses the companies are playing into the "planners" hands, as there is a national labor shortage, and at some point there will begin to be no workmen left to move from a substandard house into a new one.

At least two companies are planning to expand their output without installing new blast furnaces. The Sandvik Steel Co. and Hellefors Bruks AB are both planning the construction of sponge iron furnaces of the Wiberg-Soderfors type. Both of these developments are single links that are part of integrated modernization programs for the respective firms, but they indicate the big Swedish interest in sponge iron work.

The most important private producer of carbon steel products will be one of the companies most affected by the Swedish efforts to replace lost German imports. This firm, Domnarfvets, is now equipped to produce about 200,000 ingot tons, and plans call for output to be doubled in the next 5 yr. As everywhere here, it is hoped that this increase in production can be achieved with a minimum increase in labor. The present estimates call for the payroll to go up from the present 2700 to 3000 when the expansion is completed. This company uses electric pig iron furnaces, and local sources indicate that ingot costs are low, but are somewhat less enthusiastic about the economic future of rolling large tonnages of carbon steel products in Sweden.

The expansion of the government-owned steelworks in the north has already been discussed in some detail (see THE IRON AGE, Dec. 12, p. 98) and will eventually be an integrated unit for carbon steel production with about a half million tons annual capacity.

Uddeholm, the company that is today the largest producer of steel in Sweden, is also planning a comprehensive modernization program which will maintain the position of the firm in the postwar race. A new blooming mill was built by the firm's engineers during the war and installed at the works at Uddeholm, and this unit will serve as the backbone for a virtually complete replacement of the rolling mill equipment.

This program of new rolling mills is expected to require a period of 5 to 10 yr, and is already under way. The next important unit in the program will be the installation of a semicontinuous strip mill to handle material up to 350 mm wide. This unit is definitely chosen, although the order is not yet placed for the mill. The company hopes to have it in service in 2 yr.

A general program to catch up the arrears of the 6 war years in both repair and replacement will reach throughout the several works of the company located at Munkfors, Uddeholm, Hagfors, Stofors, Nykroppa, and the sheet mill of a subsidiary firm at Degerfors. The cold reduction mills at Munkfors which were built in the years just before the war are being expanded, and new annealing capacity is being added at present along the lines of the furnaces now existing.

The production of specialized products, including watch spring steel, razor blade blanks, flapper valve and thickness gage materials presents certain specialized annealing problems. For this reason the company usually designs its own annealing furnaces.

The company estimates at present that it could use easily 15 pct more labor than is presently available, but is otherwise in a good position. In the realm north of Lake Vanern in Sweden that is Uddeholm, even the railway that connects the mill towns and the ore mines belongs to the company. Plans to start using scrap in the new steel furnaces which are being built are posing a special problem with respect to the railway system. The scrap must come into the firm from outside its own empire, and will therefore be loaded on standard railway cars.

At present, for the scrap that is used it is necessary to reload before the material can be moved on the narrow gage system to the mill at Hagerfors where it is consumed. A long range program covering 10 yr of development has been drawn up to convert the railway to standard gage. This process will be slow and expensive as it involves not only the normal railway equipment necessary for steel operations but also the rolling stock for the supplying of the pulp mills which the firm also owns.

The custom of gathering up small tonnages of specialized steel products from all over the world and producing for these particular products (see THE IRON AGE, June 6, 1946, p. 125) has prompted four of the most important producers, including Uddeholm, Sandviken, Hofors, and Fagersta to form a joint sales body to expand export sales for all of the firms.

Details of the plans for modernization at the Fagersta mills and at Hofors have not been released, but it is known that Fagersta anticipates a substantial increase in capacity. The Sandviken steel company makes no particular secret of its plans, although it is more concerned with increasing the value of business than it is with tonnage increases.

This company considers the cooperative sales agreement among the producers to be a real achievement, and would like at some time to go forward with a system of cooperative production, with even greater specialization than is now followed. It is probable, however, that any formal arrangement to do so is only at the conversation stage at the present time. In the meantime the company is going forward with a complete program to bring the firm's mills up to date. The ultimate aim will be to increase the company's turnover by 30 to 35 pct without a substantial increase in manpower.

Principal units in the construction program are a new cogging mill, which the company hopes to have in operation in the middle of 1949, a new electric steel plant which will be brought into action in 1948-49, a sintering plant for the end of 1949, a wire rod mill scheduled for completion in 1950, the Wiberg-Soderfors sponge iron plant for mid-1950, and a 250 mm strip mill for 1952.

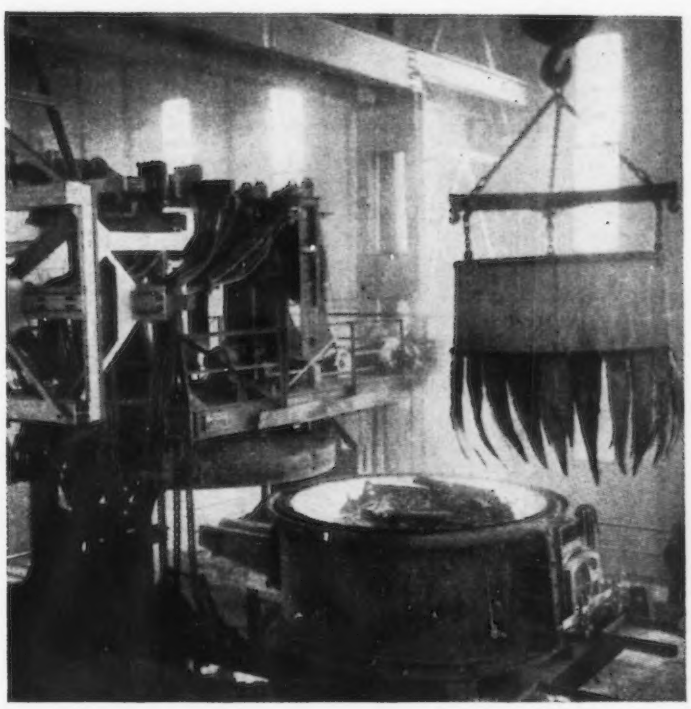
The program will also include a new tube mill, which was originally scheduled for 1949 completion, but second thoughts on the subject have given the cogging mill a higher priority, and the exact date for the tube mill is still under discussion. These dates are highly problematical, depending mostly upon the deliveries of required machinery, and the supply of manpower that is available from time to time, but the company hopes to

adhere to them as closely as possible. The progress of the power expansion program may also be a controlling factor in the steel construction.

The cogging mill has been moved up as production at Sandviken has been limited this year by the capacity of the existing mill, which is about 85,000 tons per yr. The new mill will give a capacity of about 105,000 tons, and will permit the handling of larger ingots than is now possible. The new continuous strip mill is being ordered from England at a cost of 9 million kroner ($2,490,000) for the entire installation. It is hoped to double the present strip output with the new mill without any increase in manpower.

The electric steel plant is scheduled to go into construction in 1947 with a 25-ton and a 10-ton electric arc furnace. The smaller of the two will come from England, but the decision on the larger has not been made. Present restrictions require that a building license be obtained for these projects, and the licenses have not been obtained in all cases, but the company anticipates no serious difficulty in this regard.

The tube mill that is planned will permit some increases in capacity, but is basically designed to improve the quality of the tubes being produced. There will be some special ancillary equipment installed along with the tube mill, as well as a small wire rod mill and a modest commercial bar mill. The present tube capacity is about 35,000 tons annually, about one third of which is commercial tubing, while the remainder is made up of special grades including mechanical tubing, stainless and ball-bearing material.



NEW ARC FURNACES: *New electric steel capacity will be constructed at the Sandviken Steel Co. in Sweden to supplement the furnaces already in existence.*

To demonstrate how serious the labor situation is here, Sandviken and other firms are cooperating in ingenious pooling and cooperative efforts to use every available man. This correspondent listened to the arrangements proceeding for the swap of 20 men who were temporarily idle for a commensurate amount of work from the rolling mill of another firm. Buses or station wagons belonging to the companies are a favorite means of getting the services of 15 or 20 men in a community where there is no industrial enterprise.

The manpower problem is being approached by all of the companies on as long term a basis as possible, as all are convinced that it is here to stay. The competition is particularly keen for young men, as a lowered birthrate after the 1914-18 war cut heavily into today's working force.

The only bright spot in the manpower picture in the Sandviken region will be the releases brought about when timber cutting for fuel is reduced as coal imports go up in the next 2 yr.

This release of manpower will make it possible for the company to use all of the existing capacity (four of six openhearths are operating at present) but will probably not make it any easier to get men to work in the hot steel jobs. This reluctance to take the dirty, uncomfortable work has already forced Sandviken to buy rather more of their semifinished material than they would like from outside.

U. S. Zone of Germany Doubles Production

Washington

• • • **Production in the** United States Zone in Germany has at least doubled during the past 12 months and has risen 85 pct from January to October 1946, according to the new economics division index of production. The rate of advance, however, has slowed considerably since July, according to a report by the United States Military Government to the War Dept. October production indexes for major industrial groups as percentages of the 1936 base period average were 53 for iron and steel; 38 for machinery and equipment; 79 for mining; 49 for heavy industries, and 44 for all industries.

In the week ended Nov. 30, production of pig iron and finished steel in the United States Zone reached new highs at 6850 and 7000 metric tons, respectively. Steel ingot production was virtually unchanged from the preceding week at approximately 4200 metric tons.

Lead Controls May Go

Washington

• • • **Early this week** CPA was expected to revoke all controls on the use of lead, effective Dec. 24. The action will be taken by removing the lead order, M-38.

Canada's Pig Iron Rate Up From Strike Level But Still Below Normal

Toronto

• • • **Following conclusion** of the strike at the basic iron and steel mills, Canadian pig iron production moved sharply forward, and attained a total of 74,958 net tons or 32.4 pct of rated capacity, compared with an operating rate of 19.5 pct in September. However, October output was only about 50 pct of the monthly average for the first half of the year. For the month under review pig iron output included 53,008 net tons of basic iron of which 50,442 tons were for further use of producers and 2566 tons for sale; 7364 tons of foundry iron, 192 tons for further use and 7172 tons for sale; 14,586 tons of malleable iron, all for sale. Charges to blast furnaces in October included 126,453 tons of iron ore; 14,465 tons of mill cinder, scale, sinter, etc., and 4630 tons of scrap iron and steel. At the end of the month eight furnaces were in blast and six blown out of the total of 14 stacks in Canada.

Following are comparative monthly production figures in net tons for 1946:

	Pig Iron	Ferroalloys
January	143,685	10,878
February	143,171	10,872
March	157,936	8,405
April	142,240	13,083
May	159,101	14,069
June	129,890	11,684
July	64,472	6,248
August	46,494	6,013
September	45,078	6,164
October	74,958	8,448
Total 10 Months..	1,107,025	95,859

Canadian Steel Production and Shipments

Toronto

• • • **Canadian production and producers' shipments of primary iron and steel shapes for the 3 months ended Sept. 30, showed a decline of 62.3 pct from the June quarter and were 62 pct below the totals for the first 3 months of this year. For the September quarter primary carbon steel shapes produced in Canada totalled 268,026 net tons, as compared with 709,098 net tons in the quarter immediately preceding and 703,797 net tons in the first quarter of this year. Producers' shipments of carbon steel in the third quarter amounted to 253,195 net tons; for the second quarter 720,044 net tons and in the first quarter, 703,400 net tons. Production of alloy steels in the September quarter amounted to 13,408 net tons and shipments 11,462 tons; for the second quarter production was 20,884 net tons and shipments 19,113 tons and for the first quarter production was 17,928 tons and shipments 18,715 tons. The decline in production for the 3 months under review was entirely due to the fact that Canadian primary steel makers were closed down or forced to sharply curtail output owing to the steel strike which continued from the middle of July to the end of September. The following table presents production and shipments of primary iron and steel shapes for the 3 months ended September 30th in net tons:**

	Carbon Steel		Alloy Steel	
Three Months Ended September 30, 1946	Made	Shipped	Made	Shipped
Billets, etc., for forging	7,896	8,775	608	692
Other semi-finished shapes not for re-rolling	10,454	8,964	276	138
Structural shapes and piling	5,533	7,455	15	.....
Plates	27,185	15,972	.....	.....
Rails	7,114	1,907	.....	.....
Tie plates and track material				
Splice bars	.....	.....	.....	.....
Tie plates	1,016	1,316	.....	.....
Spikes	288	575	.....	.....
Tool steel	623	937	718	631
Hot rolled bars for forging	5,711	7,787	2,335	826
Concrete reinforcing bars	15,181	13,463	.....	.....
Hot-rolled bars for cold finishing	400	399	167	71
Other hot-rolled bars	46,316	40,293	6,295	5,284
Pipes and tubes	22,787	28,013	.....	.....
Wire rods	18,548	16,320	.....	.....
Hot-rolled black sheets	4,876	7,619	.....	.....
Cold-reduced black sheets	4,409	4,409	.....	.....
Galvanized sheets	3,276	4,254	.....	.....
Steel castings—By ingot makers	2,574	3,096	130	147
By other foundries	10,145	10,136	3,287	2,133
All other shapes including tinplate, tin mill, black plate, cold-finished bars and strip, etc.	73,696	71,693	403	378
TOTAL ALL PRODUCTS	268,026	253,195	13,408	11,462

Producers' shipments of primary iron and steel shapes, sub-divided according to principal consuming industries for the September quarter in net tons follow:

Industry	Carbon Steel	Alloy Steel
Automotive industries	5,220	3,900
Agricultural, including farm machinery	6,717	48
Building construction	24,945	190
Container industry	28,534	10
Machinery and tools	15,194	1,489
Merchant trade products	23,657	145
Mining, lumbering, etc.	7,424	1,615
National defense	588	8
Pressing, forming and stamping	13,483	260
Public works and utilities	4,180	151
Railway operating	15,667	621
Railway cars and locomotives	11,808	93
Shipbuilding	3,274	151
Miscellaneous and unclassified	1,519	172
Wholesalers and warehouses	40,710	417
Producers' interchange	46,676	162
Direct export—To British Empire	2,646	225
To other countries	951	1,805
TOTAL SHIPMENTS	253,195	11,462

Canadian Steel Output Hits 41 Pct in October

Toronto

• • • **Canadian production of** steel ingots and castings responded favorably to the strike settlement at the end of September and moved up from 25.3 pct of rated capacity in September to 41 pct in October. For October output amounted to 123,841 net tons against 76,564 tons in September and 205,846 tons in October, 1945. Output for the month under review included 117,669 tons of steel ingots and 6172 tons of steel castings. Charges to steel furnaces included 44,235 tons of pig iron; 38,326 tons of scrap of consumers' own make and 60,324 tons of purchased scrap.

Cumulative production of steel ingots and castings for the first 10 months of this year totalled 1,874,687 net tons and compares with 2,454,061 tons in the 1945 period and 2,517,005 tons in 1944.

Following are comparative monthly production figures in net tons:

	Steel Ingots	Steel Castings
January	236,478	8,144
February	226,273	7,621
March	240,589	8,528
April	239,463	8,056
May	251,697	7,929
June	208,296	6,565
July	130,754	5,160
August	82,707	6,022
September	71,363	5,201
October	117,669	6,172
Total 10 Months.	1,805,290	69,397

The London ECONOMIST

Discipline and Democracy

THE sigh of relief that went up all over the country when John L. Lewis sent his miners back to the pits recently showed the depth of the tensions which the strike had revealed. The country has been spared the dangerous situation which would have been created had Lewis played out his role of being bigger than the government.

Had the mine-workers' chief proved obdurate, there was no conviction anywhere that the authority of the government would have prevailed in time to avert disastrous effects on the nation's economy and prestige abroad, the threat of violence in the coal fields, and a very ugly mood in a country deprived of coal at the onset of winter. Now the nation can breathe and work again.

The letter in which Lewis commanded his miners to resume work mixed scorn for the administration and its yellow-dog injunction with pious references to the country's interest, and a healthy sense of the prudence of at least a show of respect to the Supreme Court. Its wording could not, however, conceal the fact that President Truman had won a victory—the first in many months—and the President's firmness in the face of divided counsels in his own administration has enhanced his stature.

Lewis' tactics follow the usual pattern of permitting a breathing-space while setting a new deadline. The miners will now work up until Mar. 31, the usual date for a new contract.

Early in January the Supreme Court, bypassing the Court of Appeals, will hear the union's appeal against the temporary injunction granted by Judge Goldsborough and the heavy penalties levied on Lewis and the United Mine Workers. This decision will not, however, determine whether Lewis was within his legal rights in ending his contract with the government.

But the truce—for it is no more than that—will allow time for the reported negotiations between the miners and the owners to be pursued, and for Congress to pass legislation to protect the community from the abuses of labor monopolies. Already the Republican party is demanding that the members of the Senate Labor Committee, when it is organized, should be men favoring restrictions upon the power of the unions. This mood makes it likely that the new chairman will be Senator Taft.

Meanwhile the nation, so recently huddled around oil-burners and wood fires, is engaging in a debate far more searching than has been evoked by any other strike this year. Significantly, few people discuss the intrinsic merit of the miners' claims. Last spring they did.

Last spring Lewis said that his miners needed a welfare fund, and while skeptics wondered why he was so late in thinking about it, the majority who had seen the mine towns in life or in picture were inclined to agree that a little welfare might help. This time he did not say what he wants, though friendly reporters have made guesses. He limited himself to saying what he did not want, which was to stand by the contract he signed on May 29. It is not easy to tap the public's tears for that.

WHAT does engage popular attention is the whole problem of industrial labor disputes in their relation to the common good. The sympathy for labor's side which characterized the years between 1933 and 1945 and reached its climax in the Wagner Act has been strained since the war's end by strikes that have made labor look too big to be sorry for. In 1946 it is the public that feels small and unprotected.

Public opinion polls show a hardening of the public temper and an increased criticism of union words and deeds. They reflect a growing impatience with free collective bargaining, and

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with labor's insistence on the right to strike when it chooses. Bit by bit the blame that used to be focused on the New Deal has been turned on "them strikers now—looks like they don't want to work."

Labor's present position and attitude are compared with those of industry before the Anti-Trust Act was passed, of speculative capital before the Securities and Exchange Commission Act was passed, and (by the irreverent) with those of gangsters before Al Capone was jailed. Much of this may be unfair, but it is likely to be effective. The recent election showed how surely the public's wrath, focused on a scapegoat, pushed out the goat.

Discussion of what can or should be done ranges on three levels—(1) the immediately practical level of what can be done to keep the miners at work and the coal coming out of the ground; (2) on the still practical if somewhat deeper level of what is to be done to insure the country against another year of strikes like the one just going by; (3) and deepest, on the problem which underlies the others, is a law, the only discipline which a democracy can expect is citizens to heed, or are there others, perhaps more powerful, which this democracy is neglecting?

ARGUMENT on the first level concerns itself with coercing Lewis, the mine owners, or the government, depending on the speaker's point of view. The miners themselves are dismissed as obedient, if somewhat sooty, sheep who have no will except to follow where John L. Lewis leads. His decision to send the men back

(CONTINUED ON PAGE 142)

Says Labor Monopolies Have Prevented Output Of Necessities of Life

New York

• • • **Labor monopolies** have on innumerable occasions restricted or prevented the production or sale of the necessities of life. Nathan L. Miller, general counsel of U. S. Steel Corp. and former Governor of the State of New York, declared at a dinner of the New York County Lawyers' Assn. held at the Waldorf-Astoria.

Such monopolies "may be as harmful to the common good and to individual rights as any other kind of monopoly," the former Governor said. "All should be amenable to the law. None should be permitted to set itself above the law and the public interest. It is intolerable that any man or group of men, whether representing capital or labor, should have the power to wreck the national economy or to paralyze the public services and essential industries."

Mr. Miller declared that "the rule of men is displacing the rule of law in Federal matters, and is gradually extending its influence over purely intrastate matters. The time has certainly come for a careful revision of our laws to safeguard the public interest, to make all equal before the law, and to enable this country to resume its forward march under a Government of just and equal laws.

"The rule of law requires equality. That all must be equal before the law in a free country is another truism that is too often forgotten. I do not now speak of administrative law and practice which, under the best of conditions, are bound to be more or less discriminatory, because that is inherent in the nature of man. No judicial review can change that.

"I refer to statutes which are avowedly and intentionally discriminatory.

"The tendency to discriminate is inherent in all forms of government. That is one of the reasons why the founding fathers provided checks and balances. It is inevitable under autocratic government and has been one of the rocks on which all forms of government have foundered in the past.

"That has been the primary cause of the predicament in which we now find ourselves and the danger is that we may go too far the other way, when our effort should be to restore a proper balance.

"To put employees on a plane of equality with their employers, they too must be permitted to bargain collectively, with all reasonable safeguards. Indeed, the courts many times said that the workers had that right before it was secured to them by legislation which, however, was so one-sided as in practice to result in coercion rather than bargaining. At one time the workers had to take or leave what was offered. Now, the shoe is on the other foot and the public foots the bill."

Professional Engineers Are Making Studies On New Labor Legislation

Washington

• • • **President Ritchie Lawrie, Jr.,** of the National Society of Professional Engineers has announced that the Society is engaged in collecting the views of all elements of the engineering profession in preparation for recommending changes in existing labor legislation to the 80th Congress. Mr. Lawrie's statement was made on behalf of the NSPE, following its twelfth annual meeting in Atlanta, Ga., which was attended by leading professional engineers from all sections of the country.

"The engineering profession has not been immune to the problems of labor organizations," the NSPE President stated. "It has had to wrestle with the problem at first hand and has seen some of the more unfortunate aspects of unionization insofar as the engineering profession is concerned. It has come to the conclusion that changes should be made in existing Federal legislation."

NSPE has been cooperating with other engineering societies in the preparation of a preliminary statement of policy on this subject, Mr. Lawrie stated.

Mr. Lawrie pointed out that membership in NSPE has increased by 30 pct in 1946 and that more and more engineers have taken the necessary steps to be legally registered according to the laws of the state in which they practice. He pointed out that engineers have gained a new eminence in the eyes of the public as a result of their achievement during the war years.

"The engineer played a vital role in the development of a destructive program," Mr. Lawrie said. "He will now take an important part in the constructive program ahead. He must be ready to assume not only his technical responsibility in this program, but his civic and social responsibility as well."

Plans for the new year for NSPE will include active study of the many problems confronting the profession, and reports and representations on legislation affecting the engineer.

Coming Events

Dec. 26-31 International Science Exhibition, Boston.

Jan. 6-8 Institute of Scrap Iron & Steel, Inc., convention and exhibition, New York.

Jan. 27-31 Electrical Engineering Exposition, New York.

Jan. 27-31 International Heating and Ventilating Exposition, Cleveland.

Jan. 28-Feb. 2 Society of Plastics Engineers, exhibition, Chicago.

Mar. 17 American Institute of Mining & Metallurgical Engineers, world conference on mineral resources, New York.

Mar. 17-19 American Society of Lubrication Engineers, annual meeting, Pittsburgh.

Mar. 22 Western Metal Conference and Exposition, American Society for Metals, Oakland, Calif.

Mar. 31-Apr. 2 Midwest Power Conference, Chicago.

Apr. 29-May 1 Industrial Packaging and Materials Handling Exposition, Industrial Packaging Engineers Assn. of America, Chicago.

Wilson Strikes Out At Abuse of Power Under The Guise of Unionism

Chicago

• • • **Before the largest gathering** in history of the Illinois Manufacturers Assn., Charles E. Wilson, president General Motors Corp., struck out at the "predatory abuse of monopolistic power under the guise of unionism." Mr. Wilson's talk centered around six major problems some of which he said would have existed even if there had been no World War.

Mr. Wilson stated that the nation's lawmakers, as a result of the last election, now have a clear cut mandate to amend the faulty federal laws under which trade unions have pleaded immunity from injunction or from liability for damages, plus violence and intimidation. The president of General Motors reviewed the stated purpose of the National Labor Relations Act which is: "To diminish the causes of labor disputes burdening or obstructing intrastate and foreign commerce."

"This law," said Mr. Wilson, "has not accomplished this desirable purpose. In fact, the abuse of power that this act has given unions and union leaders has multiplied the troubles the act was intended to eliminate."

The General Motors executive pointed out that, "While there are notable records of success of both employers and their employees without unions, there is no record of a successful union without a successful employer." He went on to say that he was not in favor of reverting to the horse and buggy days of unions but many modifications are needed in the present-day setup wherein single labor personalities have dictatorial power.

Concerning the new laws or modifications of the old ones affecting unions and workmen generally, Mr. Wilson claimed that they should be consistent with the following principles:

(1) They must be economically sound. The effort to find political shortcuts to prosperity without work must be abandoned.

(2) They must be ethically and socially sound.

(3) They must be legally sound and enforcible.

(4) They must be practical and understandable.

(5) They must recognize the principle that we can all have more if we produce more. They must reward industry and thrift and recognize that laziness and dissipation must pay their penalty.

(6) They must recognize the right to work, to compete for a job and earn a living, is superior to the privilege of striking.

(7) They must recognize that labor monopolies just as any other form of business monopoly, are intolerable in a free society and must be regulated by the government or prohibited.

In discussing industrywide bargaining, Mr Wilson was in favor of prohibiting that practice. He said, "It is the essence of monopoly in labor relations that has importantly contributed to the nation's present difficulty. If labor monopolies are permitted on an industrywide basis, employer cartels to match them are thereby made inevitable, and the product of this situation in the end will require state control of both. He recommended that Americans observe how this experiment is developing and worked out in England before we commit ourselves irrevocably to the same course.

Bureau of Mines Adds New Films on Aluminum

Washington

• • • **Four new films depicting** the brazing and welding of aluminum have been added to the extensive library of educational motion pictures maintained by the Bureau of Mines. They are now available for free showing to schools and colleges, the armed services, scientific groups, civic clubs and other interested organizations.

Produced in cooperation with a large aluminum manufacturing company without Government expense, the films are in 16-mm sound and replace a former picture on "How to Weld Aluminum," which was widely distributed during the past few years. The new films carry the titles, "How to Braze Aluminum"; "How to Weld Aluminum-Torch Welding"; "How to Weld Aluminum-Arc Welding"; and "How to Weld Aluminum-Resistance Welding."

Applications for free, short-term loan of the films should be addressed to the Graphic Services Section, Bureau of Mines, 4800 Forbes Street, Pittsburgh 13, Pa. The borrower should state specifically that he is equipped to show 16-mm sound films. He also is expected to pay transportation charges and for any loss or damage other than normal wear.

SLIPPERY WHEN WET: *Carefully posed scene in the Stalin plant in Moscow where the ZIS-110, top official car is manufactured. Note the remarkably clean mosaic floor and the presence of a woman on the assembly line. Trucks are also built in this plant which, according to Soviet sources, turns out 70,000 units, principally trucks, each month.*

Industrial Briefs...

• FORM ORGANIZATION — C. P. Fisken, former advertising manager and sales executive of Chevrolet Motor Div. and Robert L. Perry, business editor and public relations executive have formed a new organization known as Sales Counselors, Inc., to assist business management in sales development and public relations.

• ATLANTA OFFICE — General Detroit Corp., manufacturers of fire extinguishers, motorized fire apparatus and allied equipment is opening an Atlanta factory branch and warehouse. J. H. Gaines will be in charge. The Atlanta office will serve Alabama, Florida, Georgia, Mississippi, South Carolina and Tennessee.

• ADDS VACUUM CLEANERS — The Automatic Washer Co., Newton, Iowa, has begun the manufacture of vacuum cleaners on a production line basis. The new product is in addition to the washing machines they have made in the past. The company hopes to build 10,000 washers by the end of this year and is planning for a total production of 100,000 units in 1947.

• FLAME RESISTANT FINISH — Monsanto Chemical Co. has announced that its Merrimac division, Boston, has begun volume production of a flame resistant fabric finish for both exterior and interior surfaces of aircraft. The coating is called Skylac and was initially developed for the armed forces during the war. The improved finish affords additional safeguards to the presently used material as its burning rate is about one fourth that of conventional finishes. It ignites more slowly and unless heat is applied from without, the flame tends to go out. Skylac contains a fungicide which protects the fabric from deterioration by mildew and the material is equally adaptable for inside finishes.

• SOIL PIPE OUTPUT—The Gadsden Foundry, Gadsden, Ala., idle since 1933, resumed operation producing soil pipe. The Gadsden Foundry is a unit of the Alabama Pipe Company which operates two other foundries at Gadsden.

• LE ROI EXPANDS—The Le Roi Co., Milwaukee, has purchased material inventories from the rock drill division of the Cleveland Pneumatic Tool Co., Cleveland, in order that the Cleveland firm secure additional space for production to meet a backlog of $18,000,000 in orders for aircraft units.

• A-C BUYS PLANT — Allis-Chalmers Mfg. Co., Milwaukee, has purchased the government-owned electric control plant it operated during the war. The plant, located in the northeast section of the company property, was sold for $1,286,356,according to WAA officials.

• NEW METALS FIRM — The Great Lakes Metal Processing Co., Buffalo, has been organized here to manufacture a new and faster process for pickling iron, steel and other metals. James J. Earshen, chemical engineer and inventor of the process, is president; Edward J. Zolte, vice-president in charge of sales and Harry M. Faxstein, secrtary-treasurer. The firm plans to spend $100,000 for a new plant and machinery.

• TO MAKE GEARS—The Riley Gear Corp., Buffalo, has been organized here to manufacture industrial gears and machine parts and has already started production in a leased plant. The company is negotiating for a new plant site where it plans to build as soon as construction materials become available.

• TO BUILD WAREHOUSE—United Steel Products, Inc., 118 Grove St., Worcester, Mass., has been authorized by the CPA to build a one-story warehouse for processing flat-rolled steel products.

WAA Reports Surplus Property Now on Sale Worth Billion Dollars

Washington

• • • **Surplus property** which had an original cost of more than a billion dollars is now on sale over the nation a War Assets Administration report shows.

The surplus, divided into 24 commodity groups and unclassified property, is offered at 565 sales including sales-at-location and regional and national sales. It originally cost the government $1,105,702,000.

The greatest value among the commodity groups was in the machine tools section which accounted for $511,951,000 of the total original acquisition cost. Next was $90,119,000 in the special industry equipment classification.

Each of the sales offers only goods having an original cost of at least $50,000. However, since many sales include offerings in more than on commodity group, the value of an individual group in some cases is less than $50,000.

The Detroit regional office has only seven sales, but led the 33 regions in the amount of original cost—$260,055,000. Of this, machine tools accounted for $192,521,000. Cincinnati, with 27 sales, was next at $236,600,000 of which $189,738,000 was represented by machine tools. New York was next at $98,060,000.

San Francisco had the greatest number of sales—63, Boston was next with 52 and Los Angeles and Philadelphia each had 41.

Monthly sales volume of machine tools sold through approved dealers in the Cleveland region of WAA follows:

Month	Selling Price
January	$ 377,023.00
February	375,292.77
March	1,119,681.21
April	1,581,613.86
May	1,766,821.09
June	1,263,187.76
July	973,977.95
August	1,208,259.56
September	716,147.29
October	1,061,065.00
November	722,811.00
Total	$11,928,266.00

Listed among surplus war property offered for sale at the Sharonville Engineering Depot by WAA is a variety of machine tools, and other hand tools, hardware, pumps and electric wire, bearing "Made in Cincinnati" labels.

Construction Steel...

New York

• • • **Fabricated steel awards** this week included the following:

800 **Tons,** Hookers Point, Fla., power plant for Tampa Power & Light Co. to Bristol Iron & Steel Co. through Stone & Webster Engineering Corp., Boston.

430 **Tons,** Chicago, factory building to Bethlehem Steel Co., Bethlehem, Pa.

400 **Tons,** Odair, Wash., warehouse, U. S. Bureau of Reclamation, to American Bridge Co., Pittsburgh.

400 **Tons,** Deer Park, Tex., chemical plant for Shell Chemical Co. to Consolidated Steel Co., Baltimore, through Stone & Webster Engineering Corp., Boston.

150 **Tons,** Crussett, Ark., power plant for Crussett Lumber Co. to Consolidated Steel Co., Baltimore.

100 **Tons,** Woburn, Mass., manufacturing plant for American Geletin Co. to A. O. Wilson Structural Co., Cambridge, Mass.

• • • **Fabricated steel inquiries** this week included the following:

5000 **Tons,** Oakland, Calif., Franklin Exchange Telephone Building for Pacific Telephone & Telegraph Co.

3200 **Tons,** Island of Formosa, oil storage tanks.

3000 **Tons,** Venice, Ill., fourth section to power plant for Union Electric Power Co., Stone & Webster Engineering Corp., Boston.

2650 **Tons,** Augusta, Ga., Clark Hill Dam.

2500 **Tons,** various locations, 18 storage tanks for Pure Oil Co.

2000 **Tons,** Liberty Bend, Mo., bridge for U. S. engineer.

2000 **Tons,** Dayton, Ohio, generating station for Dayton Power & Light Co.

2000 **Tons,** Oswego, N. Y., power station for Central New York Power Co., Stone & Webster Engineering Co., Boston.

2000 **Tons,** Buffalo, N. Y., power plant extension for Buffalo Niagara Electric Co., Stone & Webster Engineering Co., Boston.

1200 **Tons,** Stamford, Conn., power house extension for Connecticut Power Co., Stone & Webster Engineering Corp., Boston.

1130 **Tons,** Northport, Wash., Columbia River bridge.

1050 **Tons,** Niagara Falls, N. Y., plant addition to E. I. du Pont de Nemours & Co., Wilmington, Del.

700 **Tons,** San Francisco, Purchaser of Supplies, Inv. 3782, girder rail, bids to Dec. 30.

600 **Tons,** Midbluff, Tex., two 100,000 bbl tanks for Pure Oil Co.

500 **Tons,** Marianna, Pa., coal washing plant.

400 **Tons,** Tacoma, Wash., six bridges, U. S. Engineers.

140 **Tons,** Harvey, Ill., Little Calumet River bridge.

100 **Tons,** Odair, Wash., stop log Spec. 1560, U. S. Bureau of Reclamation.

• • • **Reinforcing bar awards** this week included the following:

360 **Tons,** Silver City, N. M., construction on U. S. Highway No. 260, through W. T. Bookout Construction Co. to Colorado Builders Supply Co., Denver.

220 **Tons,** Los Angeles, overcrossing on Hollywood Parkway at Grand Ave., through Oberg Bros. to Soule Steel Co., San Francisco.

180 **Tons,** Tucson, Ariz., grading, paving, etc., Tucson - Ajo Highway, through P.D.O.C., to Allison Steel Co., Phoenix, Ariz.

100 **Tons,** Chicago, 130th St. bridge for city of Chicago, to Great Lakes Dredge & Dock Co., Chicago.

• • • **Reinforcing bar inquiries** this week included the following:

5620 **Tons,** Adrian, Wash., Bureau of Reclamation, Denver, Inv. G-38, 179-A, miscellaneous bars, bids to Dec. 27.

850 **Tons,** Urbana, Ill., tunnel for the University of Illinois. Bids to be in Jan. 6.

300 **Tons,** Yakima Co., Wash., overcrossing over P.S.H. 3, Yakima County Road, Director of Highways, Olympia, bids to Jan. 3.

265 **Tons,** Casper, Wyo., Bureau of Reclamation, Denver, Inv. 19, 536-A, miscellaneous bars, bids to Dec. 27.

250 **Tons,** Lowell, Mass., two dormitories for Lowell Textile School.

• • • **Plate awards** this week included the following:

1650 **Tons,** Mountain Home, Idaho, penstocks, etc., for Anderson Ranch Dam, Bureau of Reclamation, Denver, Spec. 1316, to Southwest Welding & Mfg. Co., Alhambra, Calif.

• • • **Sheet piling awards** this week included the following:

3100 **Tons,** Smith Bluff, Tex., dock for Pure Oil Co. to Carnegie-Illinois Steel Corp., Pittsburgh.

• • • **Sheet piling inquiries** this week included the following:

500 **Tons,** Chicago, jetties for Lincoln Park Board through Chicago Park district.

• • • **Rail awards** this week included the following:

6800 **Tons,** heavy rails were sold to the Duluth Mesabe Iron Range R.R. by Carnegie-Illinois Steel Corp., Pittsburgh.

6000 **Tons** were sold to the Wabash R.R. by Carnegie-Illinois Steel Corp and represents 60 pct of the total rails purchased for 1947 by this road.

South Chicago Plant Goes to Republic Steel

Washington

• • • **Sale of the $91 million** South Chicago government built steel plant to the Republic Steel Corp. was announced by WAA on Dec. 20. Republic, the present lessee paid $35 million for the plant.

Terms of sale call for $5 million cash within 10 days and $1,500,000 each year beginning Dec. 31, 1947, for a period of 20 yr, such payments aggregating $35 million and to be in full of principal and interest.

In making the award to Republic, the real property review board of WAA said that it recognized the financial position of the corporation, its successful wartime operation of the plant, and the important fact that Republic, after increasing plant operation from 600,000 net ton ingot production to a 1,200,000 net ingot ton basis, will employ 2700 persons in steel and iron output.

Copper Imports Climb

Washington

• • • **Imports of copper** totalled $7.9 million for the month of October, an increase of $2.8 million over September, according to the latest report by the Dept. of Commerce.

At the same time, imports of nickel rose from $3.4 million to $4.7 million and tin from $0.7 million to $2.9 million. In regard to tin, however, September imports were unusually low when compared with the May to August monthly average of $2.3 million.

Tinplate Order Revised

Washington

• • • **Effective Dec. 24,** CPA relaxed the controls channelling tinmill output into the production of cans for essential and perishable foods and certain pharmaceuticals. Previously, 70 pct of tinplate production had to be reserved for these uses. Tinplate may now be used for containers for any of the products listed in schedule 1 of the amended order, M-81.

CPA Cancels December Pig Iron Carryovers

Washington

• • • **Cancellation of all** December carryovers and unfilled certified orders for pig iron was ordered by CPA on Dec. 20. This action, done by amending Dir. 13 to Order M-21, was taken because of curtailed pig iron production in December as a result of the coal strike. The net effect of its order, CPA said, is to allow pig iron producers to catch their breath and get up to date in their order scheduling.

To allow consumers who are not on January schedules to get their orders placed, the amended direction also provides that pig iron producers must accept January certified orders until Jan. 5.

MACHINE TOOLS

. . . News and Market Activities

Builders Ponder Puzzling Profit Problem

• • • **While pondering on the** perennial question of what wage increase will be granted Philip Murray's United Steel Workers, some segments of the machine tool industry are also trying to figure out how they're going to make some money next year, which, according to some sources in the trade, is something of a job in itself.

Some producers believe that customers are holding back waiting for the new and enlightened labor legislation to go through, which will, it is alleged, eradicate once and for all the limitations which some shop stewards have placed on new and faster equipment, and thus put labor saving machinery in high demand.

Whether this will be the effect of the new legislation, about which little is actually known, remains to be seen, but in any event, many machine tool builders are expecting a mild business recession before the middle of next year.

Sales in many sectors during the last 3 weeks have left much to be desired, although a slight upturn has been evident in the last few days, probably indicating that customers are using up some appropriation money which must be spent before the end of the year.

Machine tool builders in the Chicago area have been disappointed by the postponement of GMC and Ford's light car program which involved hundreds of machine tools. This project was rather well along with elaborate plans laid out but the builders are hopeful that the program will get the green light so that they can begin to supply machines before the end of next year.

The tremendous number of surplus machines still being sold by WAA continues to cut into what would be the normal market. Competition from WAA is generally across the board on all types of machines with the exception of such items as universal milling machines and other non-production line equipment. Because of this competition, the builders are still being penalized for the large war effort whereby they produced unprecedented numbers of machine tools.

Some of the builders point out that the machinery being sold under surplus is not quite as damaging as it would seem. They state that the buyers of the surplus machines find themselves in need of auxiliary equipment and various accessories which cannot be purchased from WAA, so that the builders are benefiting in a small degree even from surplus sales.

As a whole, the machine tool builders are not dissatisfied with the present volume of orders and for the most part they foresee a continued good market for many months ahead. Many builders are having difficulty getting some of the materials needed to make machines so that even if they were given more business they could not, at present, actually deliver many more units than they are now able to ship. Strikes in the plants of the bearing makers have caused a shortage, particularly in needle bearings, in many of the machine tool builders' plants. Castings are still very difficult to get and are another bottleneck hampering full scale production.

In many industries the basic design of their products has not changed from that of the prewar type. A scheduled program of basically new models of many manufactured articles has been withheld because of the huge volume demanded by the buying public. Machine tool builders are hopeful that these changes in production lines will soon be made as therein lies a tremendous potential demand for new and better types of machine tools.

The market for machine tools in the Detroit area has slowed down to a walk based on a survey of prominent producers in this territory. A slackening of demand is usually felt at this season of the year, but to the normal seasonal drop has been added the repercussions from recent cancellations of new automobile tooling programs and temporary difficulties relating primarily to slow paper work in moving items from surplus.

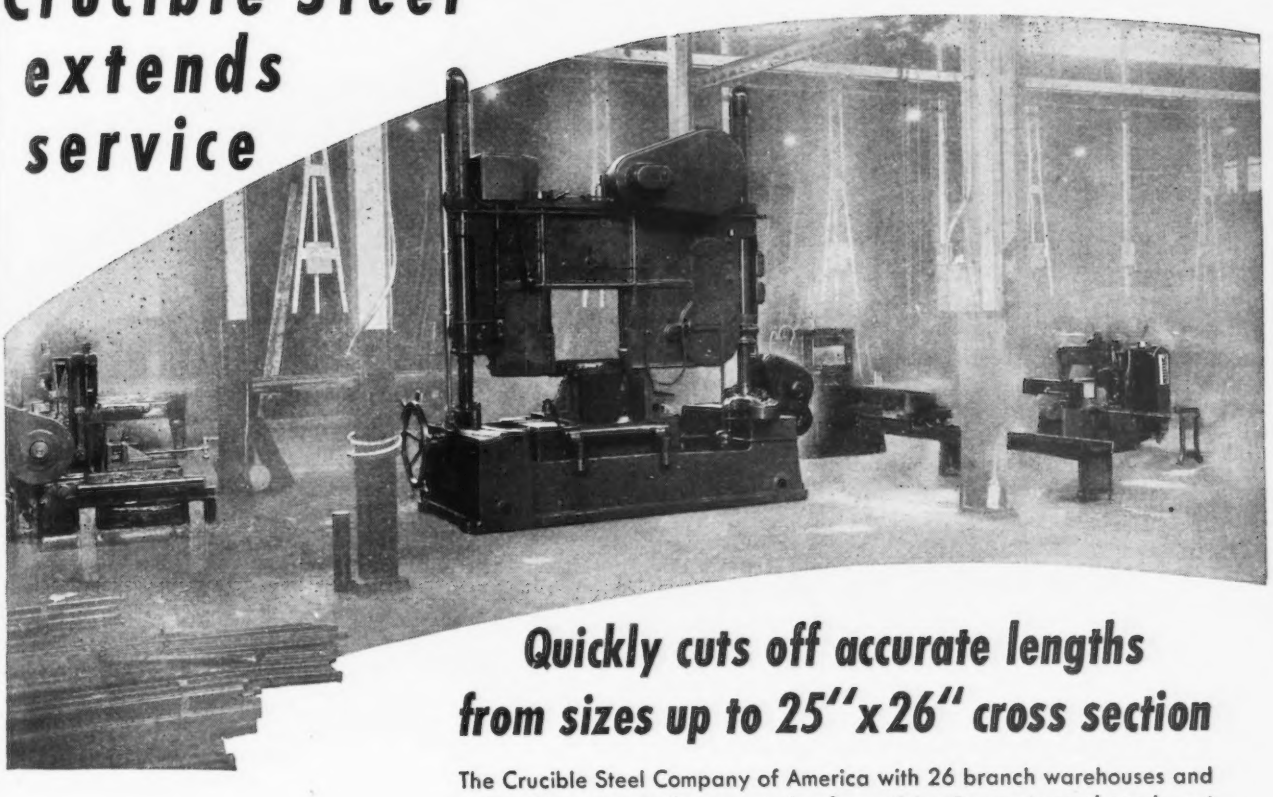
The industry here is acutely conscious of the fact that 75 pct of the surplus machines in the country are still in government warehouses and is making every effort to interest prospects in new machines featuring faster feeds and speeds and incorporating many automatic features including gaging, inspection and loading and unloading.

A trend that is clearly evident is that the number of individual operations required to do a specific machining job on an automobile will be greatly reduced in the future. For example, it is predicted that the finishing of a cylinder which now requires six operations may very well be done in three or four operations in the future. At the present time, the only extensive tooling job that is going on is the tooling of General Motors Truck where a new assembly line is being added.

A specific development of interest is the use of a carbide tip brazed to a carbide shank to finish valve guide bushings. With its higher modulus the stiffer carbide shank (which replaces a steel shank) is reported to eliminate a burnishing operation and give higher microfinish and better concentricity than the method previously used for the same operation.

In the East, a number of machine tool builders have ceased to advertise for new help in the shop and, in fact, some have signs posted at plants that no help is required. This situation, which is in sharp contrast to the need for men which some segments of the industry experienced during the war and a large part of the time since, is not due so much to current business as to the belief that it is time to stop and survey the situation, particularly the wage increases being sought in the steel and automobile industries.

Crucible Steel extends service



Quickly cuts off accurate lengths from sizes up to 25"x26" cross section

The Crucible Steel Company of America with 26 branch warehouses and sales offices, has built a reputation for anticipating customers' needs, not only in high grade and special steels, but in service requirements as well. They were among the first to equip several of their warehouses with modern high speed MARVEL Saws (No. 6 and 9A series) in order to give fast service on either single lengths or large quantities of identical pieces, accurately cut from bars up to 10" x 10" cross section. Now in anticipation of new demands for larger sizes, they are the first steel company to install a No. 24 MARVEL Hydraulic Hack Saw in order to give fast service on orders for steels of any type *in sizes up to* 25" x 26" cross section.

This giant hack saw, which almost qualified as a "secret weapon" because it contributed so materially to our production capacity in building naval ordnance, applies an entirely new principle of reciprocation that has made "hacksawing" of large work practical for the first time.

Whatever your metal sawing problems, there is a MARVEL Saw exactly suited to your needs. A MARVEL field engineer will be glad to go over your metal sawing problems with you.

No. 24 MARVEL giant Hydraulic Hack Saw. (capacity 24" x 24"). Employs new "Roll Stroke" sawing action and trouble-free low pressure hydraulic control.

No. 9A MARVEL Production Saw (capacity 10" x 10"). Automatically feeds, measures and cuts-off identical lengths from single or nested bars with no more operator attention than an automatic screw machine.

No. 6 MARVEL Saw (capacity 6" x 6"). A high-speed, heavy-duty, all-ball-bearing saw—operates up to 149 strokes per minute, cuts thru 64% of each stroke, returns in 36%.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 BLOOMINGDALE AVENUE, CHICAGO 39, U.S.A.

No. 1, No. 2 Series Capacity: 4"x4" Capacity: 6"x6" | No. 4B Series Capacity: 6"x6" | No. 6 Series Capacity: 6"x6" | No. 9A Series Capacity: 10"x10" | No. 8 Series Capacity: 18"x18" | No. 18 Series Capacity: 18"x18" | No. 24 Series Capacity: 24"x24"

MARVEL SAWS

NONFERROUS METALS

. . . News and Market Activities

Tighten Rules to Get Stockpiled Minerals

Washington

• • • **Purchase rule** changes for 20 critical metal and mineral items under PR 34 held by the Office of Metals Reserve, RFC provides that in the case of aluminum, primary producers of 50-lb pigs rather than producers of 20-lb refined ingots may apply. Copper must now be applied for on form CPA 4542 or 4513, depending on type, instead of by letter. Zinc oxide is dropped from the schedule and nickel oxide may now be purchased only by smelters and processors.

Materials for which application may be made by letter are primary pig aluminum, asbestos, beryl, bismuth, cadmium, chromite, corundum cryolite, graphite, kyanite, manganese, mica, quartz crystals, platinum, and zinc.

Application for antimony must be filed in accordance with Order M-112; pig lead, M-38; and pig tin, in accordance with Order M-43.

Requests for alloys or scrap containing cadmium, or 50 pct or more of metallic zinc, tin, lead, and bismuth require a certifying letter stating that the smelter or processor will use the material in accordance with existing orders, that he cannot obtain the materials from any other source, and that the purchase order will not increase his inventory above CPA restrictions.

Letters of application must state (a) purpose for which required, (b) present inventory, (c) number of days' supply represented by present inventory, plus amount requested, (d) efforts to obtain materials from other sources, (e) efforts to obtain and use a substitute, and (f) other pertinent information.

•

Raise Antimony to 28.25¢

• • • **The price of** antimony has been increased, effective Dec. 17, to 28.25¢ f.o.b. Laredo, Tex., from the former price of 23.50¢ by the Texas Smelting & Refining Co., the only domestic producer. The price rise was caused by an increase of 4¢ to 5¢ per lb of contained antimony for Mexican ore. Since RFC discontinued government imports and released imports recently for private enterprise, the price of ore and concentrates must be negotiated between foreign producers and the domestic smelter and is subject to change.

Chinese antimony is not being produced at this time, although it is understood that the RFC has some 3000 tons of metal which is being shipped to the United States for the stockpile at the rate of 500 tons per month.

•

Raise Zinc Oxide Price

• • • **Price increases** have been announced on leaded zinc oxide effective Dec. 16 by the American Zinc, Lead & Smelting Co. The new prices are 10.50¢ per lb for 35 pct leaded zinc oxide, and 11.125¢ for 50 pct leaded zinc oxide.

•

Tin

• • • **Detinners** do not consider that there is to be any increase in the price of tin over the 70¢ per lb during the first quarter of the year as this figure corresponds to the world price as established by Great Britain. Detinners acted to set the market price of tin immediately after price decontrol and the Office of Metals Reserve followed suit although it is by far the biggest seller of tin domestically. The domestic price of tin is expected to remain at its present figure unless the British Government takes action on a price increase as the world market is tied to their controlled export price.

Nickel

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• • • **A spot price** for nickel has not yet been established by distributors of the International Nickel Co. who are now calculating the effect of the freight rate increase, effective Jan. 1, on their costs. In the meantime customers are receiving nickel at the prices in effect before the recent contract price increase of 4½¢ per lb. It is expected that the new price may be established in the next week.

Copper

•

• • • **The price of** copper is continued by producers at 19.50¢ per lb delivered Connecticut Valley. Producers are reluctant to see an increase in price above this figure and there will probably be no necessity for an increase while the OMR stockpile of copper holds out. Before December allocations the stockpile, with first quarter deliveries, was estimated to total 205,000 tons. At a rate of allocation of some 50,000 tons per month and assuming that the minimum stockpile permitted by the Army and Navy Munitions Board may be 50,000 tons, copper is expected to be available from this source until the end of February. After that time it will be necessary to obtain foreign copper to supply domestic demand. The export price on bonded copper f.a.s. New York is now set at 19.50¢ and this price has risen rapidly over the last few months. When government stocks are exhausted, if this price still holds, it will be necessary to bring in copper at this price and pay the 4¢ duty unless Congressional action has been taken to remit it. This would bring the price of copper up to 23.50¢ per lb, delivered.

Nonferrous Metals Prices

Cents per pound

	Dec. 18	Dec. 19	Dec. 20	Dec. 21	Dec. 23	Dec. 24
Copper, electro, Conn.	19.50	1950	19.50	19.50	19.50	19.50
Copper, Lake, Conn.	19.625	19.625	19.625	19.625	19.625	19.625
Tin, Straits, New York	70.00	70.00	70.00	....	70.00	70.00
Zinc, East St. Louis	10.50	10.50	10.50	10.50	10.50	10.50
Lead, St. Louis	12.35	12.35	12.35	12.35	12.35	12.35

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99+%, f.o.b. shipping point (min. 10,000 lb)	15.00
Aluminum pig, f.o.b. shipping point	14.00
Antimony, American Laredo Tex.	28.25
Beryllium copper, 3.75-4.25% Be; dollars per lb contained Be	$14.75
Beryllium aluminum, 5% Be; dollars per lb contained Be	$27.50
Cadmium, del'd	$1.50
Cobalt, 97-99% (per lb)	$1.50 to $1.57
Copper, electro, Conn. Valley	19.50
Copper, lake, Conn. Valley	19.625
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$2.25
Iridium, dollars per troy oz.	$120.00
Lead, St. Louis	12.35
Lead, New York	12.55
Magnesium, 99.8 + %	20.50
Magnesium, sticks, carlots	36.00
Mercury, dollars per 76-lb flask, f.o.b. New York	$87 to $88
Nickel, electro, f.o.b. refinery	
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per troy oz.	$60 to $65
Silver, New York, cents per oz.	86.25
Tin, Straits, New York	70.00
Zinc, East St. Louis	10.50
Zinc, New York	10.94
Zirconium copper, 6 pct Zr, per lb contained Zr	$ 6.00

Remelted Metals

Brass Ingot

(Cents per lb, in carloads)

85-5-5-5 ingot	
No. 115	20.50
No. 120	20.00
No. 123	19.50
80-10-10 ingot	
No. 305	23.50
No. 315	22.00
88-10-2 ingot	
No. 210	25.75
No. 215	24.75
No. 245	21.75
Yellow ingot	
No. 405	16.25
Manganese Bronze	
No. 421	18.25

Aluminum Ingot

(Cents per lb, lots of 30,000 lb)

95-5 aluminum-silicon alloys:	
0.30 copper, max.	17.50—17.75
0.60 copper, max.	17.00—17.50
Piston alloys (No. 122 type)	16.25—17.00
No. 12 alum. (No. 2 grade)	16.00—16.75
108 alloy	16.00—16.75
195 alloy	16.75—17.50
AXS-679	16.50—16.75
Steel deoxidizing aluminum, notch-bar, granulated or shot.	
Grade 1—95 pct-97½ pct	16.50
Grade 2—92 pct-95 pct	16.00
Grade 3—90 pct-92 pct	15.50
Grade 4—85 pct-90 pct	15.25—15.50

Electroplating Supplies

Anodes

(Cents per lb, f.o.b. shipping point in 500 lb lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer	34⅞
Electrodeposited	28⅝
Rolled, oval, straight delivered	29⅛
Curved, 18 in. or longer, delivered	29⅛
Brass, 80-20, frt allowed	
Cast, oval, 15 in. or longer	31⅜
Zinc, Cast, 99.99	18¾
Nickel, 99 pct plus, frt allowed	
Cast	51
Rolled, depolarized	52
Silver, 999 fine	
Rolled, 1000 oz lots, per oz.	90.00

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum	34.00
Copper sulphate, 99.5, crystals, bbls	7.75
Nickel salts, single, 425 lb bbls, frt allowed	14.50
Silver cyanide, 100 oz lots, per oz	74.5
Sodium cyanide, 96 pct, domestic, 100 lb drums	15.00
Zinc cyanide, 100 lb drums	33.00
Zinc, sulphate, 89 pct, crystals, bbls, frt allowed	.0635

Mill Products

Aluminum

(Cents per lb, base, subject to extras for quantity, gage, size, temper and finish)

Drawn tubing: 2 to 3 in. OD by 0.065 in. wall: 3S, 43.5¢; 52S-O, 67¢; 24S-T, 71¢; base, 30,000 lb.

Plate: ¼ in. and heavier: 2S, 3S, 21.2¢; 52S, 24.2¢; 61S, 23.8¢; 24S, 24S-AL, 24.2¢; 75S, 75S-AL, 30.5¢; base, 30,000 lb.

Flat Sheet: 0.136-in. thickness: 2S, 3S, 23.7¢; 52S, 27.2¢; 61S, 24.7¢; 24S-O, 24S-OAL, 26.7¢; 75S-O, 75S-OAL, 32.7¢; base, 30,000 lb.

Extruded Solid Shapes: factor determined by dividing the perimeter of the shape by its weight per foot. For factor 1 through 4, 3S, 26¢; 14S, 32.5¢; 24S, 35¢; 53S, 61S, 28¢; 63S, 27¢ 75S, 45.5¢; base, 30,000 lb.

Wire, Rod and Bar: screw machine stock, rounds, 17S-T, ¼ in., 29.5¢; ½ in., 37.5¢; 1 in., 26¢; 2 in., 24.5¢; hexagons, ¼ in., 35.5¢; ½ in., 30¢; 1in., 2 in., 27¢; base, 5000 lb. *Rod:* 2S, 3S, 1¼ to 2½ in. diam, rolled, 23¢; cold-finished, 23.5¢ base, 30,000 lb. *Round Wire:* drawn, coiled, B & S gage 17-18: 2S, 3S, 33.5¢; 56S, 39.5¢; 10,000 lb base; B & S gage 00-1: 2S, 3S, 21¢; 56S, 30.5¢. B & S 15-16: 2S, 3S, 32.5¢; 56S, 38¢; base, 30,000 lb.

Magnesium

(Cents per lb, f.o.b. mill)

Sheet and Plate: Ma, FSa, ¼ in.,54¢-56¢; 0.188 in., 56¢-58¢; B & S gage 8, 58¢-60¢; 10, 59¢-61¢; 14, 69¢-74¢; 16, 79¢-81¢; 18, 87¢-89¢; 22, $1.25-$1.31; 24, $1.71-$1.75. Base quantity, 30,000 lb.

Round Rod: M, diam in. ⅛, 55¢; ¼, 47¢; ⅜, 46¢; ½, 45¢; ¾, 44¢; 1¾, 43.5¢; 2, 42.5¢; 3, 41.5¢; 4, 42.5¢ 5, 43.5¢; 6 & 7 in., 44¢. Base price, 5000-10,000 lb.

Square and Hexagonal Bar: M, diam in. ¼, 58¢; ¼, 50¢; ⅜, 48¢; ½, 47.5¢; ¾, 46.5¢; 1¾, 45.5¢; 2, 44.5¢; 3, 43.5¢; 4 & 5 in. 44.5¢; 6 & 7 in., 45¢. Base quantity, 5000-10,000 lb.

Tubing: Varies with wall thickness and outside diameter.

Nickel and Monel

(Cents per lb, f.o.b. mill)

	Nickel	Monel
Sheets, cold-rolled	54	43
No. 35 sheets	..	41
Strip, cold-rolled	60	44
Rod		
Hot-rolled	50	39
Cold-drawn	55	44
Angles, hot-rolled	50	39
Plates	52	41
Seamless tubes	83	71
Shot and blocks	..	31

Zinc

(Cents per lb, f.o.b. mill)

Sheet, l.c.l.	15.40
Ribbon, ton lots	14.50
Plates	
Small	13.25
Large, over 12 in.	14.25
Lithographic, ungrained	17.25

Copper, Brass, Bronze

(Cents per lb)

	Extruded Shapes	Rods	Sheets
Copper	30.78	....	30.93
Copper, hot-rolled	....	27.23	....
Copper, drawn	....	28.28	....
Low brass, 80 pct	37.52	28.71	29.02
High brass	36.03	27.22	27.53
Red brass, 85 pct	38.03	29.22	29.53
Naval brass	27.50	26.25	32.19
Brass, free cutting	....	22.28	....
Commercial bronze	39.06	30.25	30.56
Manganese bronze	31.07	29.57	35.69
Phosphor bronze, 5 pct	....	49.07	48.82
Muntz metal	27.19	25.94	30.38
Everdur, Herculoy			
Olympic, etc.	34.45	34.73	35.79
Nickel silver, 5 pct	....	38.11	36.34
Architectural bronze	26.01	....	....

Scrap Metals

(Dealers' buying prices, f.o.b. New York)

Copper and Brass

(Cents per lb)

No. 1 heavy copper and wire	14¾—15¼
No. 2 heavy copper and wire	13¾—14¼
Light copper	12¼—12¾
Auto radiators (unsweated)	11¼—11¾
No. 1 composition	14 —14½
No. 1 composition turnings	13 —13½
Clean red car boxes	11 —11½
Cocks and faucets	11½—12
Mixed heavy yellow brass	9 — 9½
Old rolled brass	8¾— 9¼
Brass pipe	10¼—10¾
New soft brass clippings	11 —11½
Brass rod ends	9¾—10¼
No. 1 brass rod turnings	10 —10½

Aluminum

(Cents per lb)

Alum. pistons with struts	4½— 5
Aluminum crankcases	7½— 8
2S aluminum clippings	8¼— 8½
Old sheet & utensils	7½— 8
Mixed borings and turnings	3 — 3¼
Misc. cast aluminum	7 — 7½
Dural clips (24S)	6 — 6½

Zinc

(Cents per lb)

New zinc clippings	7 — 7½
Old zinc	5¼— 5¾
Zinc routings	3 — 3½
Old die cast scrap	3 — 3¼

Nickel and Monel

(Cents per lb)

Pure nickel clippings	21 —22
Clean nickel turnings	17 —18
Nickel anodes	19½—20½
Nickel rod ends	20 —21
New Monel clippings	14 —15
Clean Monel turnings	10 —11
Old sheet Monel	12 —12½
Old Monel castings	10 —11
German silver clippings, mixed	10½—11
German silver turnings, mixed	7 — 7¼

Lead

(Cents per lb)

Soft scrap lead	10¾—11
Battery plates (dry)	5¼— 5½

Miscellaneous

(Cents per lb)

Block tin	60
No. 1 pewter	46 —48
No. 1 auto babbitt	36 —37
Mixed common babbitt	12 —12½
Solder joints	13½—14
Siphon tops	38
Small foundry type	16 —16½
Monotype	13½—14
Lino and stereotype	13 —13½
Electrotype	11 —11½
New type shell cuttings (nom.)	12 —12½
Clean hand picked type shells	5½— 6
Lino and stereo dross	6 — 6½
Electro dross	4 — 4½

Lead Products

(Cents per lb)

F.o.b. shipping point freight collect. Freight equalized with nearest free delivery point.

Full lead sheets	15.80
Cut lead sheets	16.30
Lead pipe, manufacturing point	15.05
Lead traps and bends	List +35%
Combination lead and iron bends and ferrules, also combination lead and iron ferrules	List +35%
Drum traps, U.S. list	List +35%
Montclair traps	List +35%
Lead wool	17.05

SCRAP

Prices Continue Their Upward Climb

New York

• • • **Heavy melting steel again led off the market, scoring gains of $2 over prices prevailing last week. Cast grades also staged sharp rises to close several dollars higher in Pittsburgh, Chicago and Cleveland.**

All reports indicate that the trade is well aware that the present scrap market is a "hot" one. Not a few sources on the selling end are of the opinion prices will go still higher but more conservative elements are inclined to discount their theories as wishful thinking.

The present scrap market is like Stephen Leacock's headless horseman in that it might at any moment take its head in its hands and "ride rapidly off in all directions." While some brokers have been reaping a rich harvest, prices have moved so fast in the past 10 days or so that some have been caught short and badly burned.

It is still too early to assess the effect on volume of the advance of about 50 pct in heavy melting steel prices since OPA's demise. A few districts report an increase in shipments but others state there is little change. It appears clear, however, that most of the dealers who held off when the upward movement began on Dec. 16 have begun to unload.

Steel mill purchasing agents have replaced some of their cross hauling with cross talk—directed at those they consider responsible for current high prices. Most will agree that some scrap price increase was due and hope to be able to get their purchases back into normal markets. All sources agree that increased costs of collecting and preparing scrap justified some increase, few will grant that it had to be as heavy as it was.

Sound and considered judgment on where this market will stop is not currently obtainable but steel sources are privately wondering how much of a scrap price rise they can stand without touching off another wave of general price increases.

PITTSBURGH—The reluctance of dealers to sell scrap before the end of the year is a major factor in forcing prices up and the beginning of real winter weather will make more acute the mills' position as to supplies. The market is still on the upsurge and observers are hesitant to anticipate what the peak will be and when it will be reached. Heavier buying in this area is establishing firm prices. Up to this time, much of the pricing has been speculative, but current offers are making the prices firm. The shortage of scrap is expected to continue at least until something is definitely known about the steel wage negotiations.

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CHICAGO—Because of the break in eastern prices this market was forced to go along and there are plenty of signs that the price may continue up in the very near future. The last railroad list broke all previous prices and cast scrap is still bringing premiums. Many buyers do not believe the hiking of prices will increase the volume of scrap moved to the mills.

•

PHILADELPHIA—Prices of all grades of heavy melting were increased again last week and heavy axle forge turnings for electric furnace charges have reached heavy melting prices. Low phos prices are $3 above heavy melting. Cast scrap is up another dollar. Turnings, cast iron borings and mixed borings and turnings are selling in a single range of $23.00 to $23.50. These higher prices are said to be bringing out larger tonnages of scrap.

•

DETROIT—The so-called formula for the Detroit scrap market of $10 over ceiling prices went by the boards this week as the price of most steel grades moved forward on a broad front. Cast grades are holding at substantially the previous levels with indications of increased resistance to prevailing price levels.

•

NEW YORK—The market here zoomed up so fast following the break on Dec. 16 that some brokers who took orders on that day in the neighborhood of $22.50 were caught short on thousands of tons when the price advanced quickly to $25.50. The lighter end of the list also registered advances following the big move. Despite substantially higher prices there is little indication of any appreciable increase in the volume of material moving, particularly since this time of the year normally sees a falling off in shipments.

•

BOSTON—Heavy steel has registered an extreme gain of $4.65 a ton and turnings $2. Foundry scrap is all of $5 a ton higher at $40 to $45 a ton, but $40 is being paid more often than 45. Some heavy steel and some turnings have been attracted by the higher prices, but the market is by no means active. The loc Navy yard will take bids Jan. 3 on 5 tons of unprepared steel, 200 tons heavy melting steel and 200 tons of lig iron.

•

CLEVELAND—As an aftermath of la week's price flurry, the scrap market once more in a somewhat stable stat and indications are the present price may hold until sometime after the firs of the year. Some major consumers ar buying at the new "formula," but other are out of the market temporarily an their re-entry is not expected to advance prices. Present prices are making scra almost too hot for some of the trad to handle and some unloading will prob ably take place after the first of the year. Because there is so little scrap, the pres ent market will be hard to break, with weather an important contributing factor.

•

BUFFALO—Steel making scrap at $2 had the trade in a dither this week but the advance failed to bring out any great volume of material. Many dealers blamed income taxes for this situation. Rail grades were marked up $4 and one of the leading mills was offering $23 Buffalo for alloy free machine shop turnings without much success. Blast furnace items were nominally unchanged at the old prices. The trade was up in arms over an article in a recent issue of a New York financial daily on cast scrap, which quoted a price of $50 to $75 a ton. At last week's meeting of the local chapter of the Scrap Institute, a resolution was passed condemning such "scare" stories. Actually, the local market for cast is highly irregular, with $40 the absolute top and some contracts ranging down to $30 or $31.

•

BIRMINGHAM—In line with higher scrap prices in other sections of the country a sharp advance for openhearth and foundry grades has occurred in this market. Heavy melting steel has advanced $5 per ton with other items following. Meanwhile, inventories are dangerously low here, both at mills and foundries.

•

TORONTO—Canadian scrap markets have developed a state of listlessness, partly the result of the year-end holiday season, but chiefly due to the limited supply of scrap reaching the market. New offerings were further reduced in the week with only a few small deliveries reported from outside points and some falling off in supply from industrial plants. Supply of both steel and iron grades is short and no large reserve stocks are available. Scrap prices continue under ceiling control but there is a feeling in the trade that higher prices may become effective early in 1947. However, it is not believed that a price boost would have much stimulating effect on offerings.

Going prices as obtained in the trade by IRON AGE editors, based on representative tonnages. Pending establishment of a market in some districts and in certain grades, the former OPA ceiling price is inserted for reference, followed by an asterisk.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$32.00 to	$32.50
RR. hvy. melting	33.00 to	33.50
No. 2 hvy. melting	32.00 to	32.50
RR. scrap rails	33.50 to	34.00
Rails 3 ft. and under	35.00 to	36.00
No. 1 comp'd bundles	32.00 to	32.50
Hand bdld. new shts.	32.00 to	32.50
Hvy. axle turn.	29.00 to	29.50
Hvy. steel forge turn.	29.00 to	29.50
Mach. shop turn.	23.50 to	24.00
Short shov. turn.	28.00 to	28.50
Mixed bor. and turn.	26.00 to	26.50
Cast iron borings	26.00 to	26.50
No. 1 cupola cast	37.00 to	38.00
Heavy breakable cast	30.00 to	31.00
Malleable	37.00 to	38.00
RR. knuck, and coup.	36.50 to	37.00
RR. coil springs	36.50 to	37.00
Rail leaf springs	36.50 to	37.00
Rolled steel wheels	36.50 to	37.00
Low phos.	34.50 to	35.00

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$32.00 to	$32.50
No. 2 hvy. melting	32.00 to	32.50
No. 1 bundles	32.00 to	32.50
No. 2 dealers' bndls.	32.00 to	32.50
Bundled mach. shop turn.	32.00 to	32.50
Galv. bundles	23.00 to	23.50
Mach. shop turn.	24.50 to	25.00
Short shovels, turn.	26.50 to	27.00
Cast iron borings	22.50 to	23.00
Mix. borings & turn.	24.50 to	25.00
Low phos. hvy. forge	37.50 to	38.00
Low phos. plates	34.50 to	35.00
No. 1 RR. hvy. melt.	30.50 to	31.00
Reroll rails	35.50 to	36.00
Miscellaneous rails	34.50 to	35.00
Angles & splice bars	35.50 to	36.00
Locomotive tires, cut	35.00 to	37.00
Cut bolsters & side frames	32.00 to	32.50
Standard stl. car axles	32.00 to	32.50
No. 3 steel wheels	32.50 to	33.00
Couplers & knuckles	32.50 to	33.00
Malleable	43.00 to	45.00
No. 1 mach. cast	42.00 to	46.00
Rails 3 ft. and under	37.00 to	37.50
No. 1 agricul. cast	35.00 to	36.00
Hvy. breakable cast	35.00 to	36.00
RR. grate bars	35.00 to	35.50
Cast iron brake shoes	35.00 to	35.50
Stove plate	36.00 to	36.50
Clean auto cast	37.00 to	37.50
Cast iron carwheels	35.00 to	35.50

CINCINNATI

Per gross ton delivered to consumer:

Cast grades f.o.b. shipping point

No. 1 hvy. melting	....	$23.70
No. 2 hvy. melting	....	23.70
No. 1 bundles	....	23.70
No. 2 bundles	....	23.70
Mach. shop turn.	$15.50 to	16.00
Shoveling turn.	17.50 to	18.00
Cast iron borings	16.50 to	17.00
Mixed bor. & turn.	16.50 to	17.00
Low phos. plate	....	27.00
No. 1 cupola cast	....	30.00
Hvy. breakable cast.	....	25.00
Stove plate	....	28.00
Scrap rails	....	26.00

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars

No. 1 hvy. melting	$23.00 to	$25.00
No. 2 hvy. melting	23.00 to	25.00
Nos. 1 and 2 bundles	23.00 to	25.00
Busheling	23.00 to	25.00
Turnings, shovelings	18.50 to	19.00
Machine shop turn.	16.50 to	17.00
Mixed bor. & turn.	16.50 to	17.00
Cl'n cast, chem. bor.	18.06 to	18.81
No. 1 machinery cast	40.00 to	45.00
No. 2 machinery cast	40.00 to	45.00
Heavy breakable cast	....	40.00
Stove plate	40.00 to	45.00

DETROIT

Per gross ton, brokers' buying prices:

No. 1 hvy. melting	$28.00 to	$29.00
No. 2 hvy. melting	28.00 to	29.00
No. 1 bundles	28.00 to	29.00
New busheling	28.00 to	29.00
Flashings	28.00 to	29.00
Mach. shop turn	20.00 to	21.00
Short shov. turn	22.00 to	22.50
Cast iron borings	$21.50 to	$22.00
Mixed bor. & turn.	21.00 to	21.50
Low phos. plate	30.00 to	30.50
No. 1 cupola cast	42.00 to	45.00
Charging box cast	41.00 to	44.00
Hvy. breakable cast	38.00 to	40.00
Stove plate	38.00 to	40.00
Automotive cast	43.00 to	45.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$30.50 to	$31.50
No. 2 hvy. melting	30.50 to	31.50
No. 1 bundles	30.50 to	31.50
No. 2 bundles	30.50 to	31.50
Mach. shop turn.	23.00 to	23.50
Shoveling turn.	23.00 to	23.50
Cast iron borings	23.00 to	23.50
Mixed bor. & turn.	23.00 to	23.50
No. 1 cupola cast	41.00 to	42.00
Hvy. breakable cast	40.00 to	41.00
Cast. charging box	40.00 to	41.00
Clean auto cast	41.00 to	42.00
Hvy. axle forge turn	30.50 to	31.50
Low. phos. plate	33.50 to	34.50
Low phos. punchings	33.50 to	34.50
RR. steel wheels	33.00 to	35.00
RR. coil springs	33.00 to	35.00
RR. malleable	35.00 to	40.00

ST. LOUIS

Per gross ton delivered to consumer:

No. 1 hvy. melting	$27.75 to	$28.25
Bundled sheets	27.75 to	28.25
Mach. shop turn.	....	19.00
Locomotive tires, uncut	....	25.00
Misc. std. sec. rails	32.00 to	34.00
Rerolling rails	34.00 to	35.00
Steel angle bars	30.00 to	31.00
Rails 3 ft. and under	35.00 to	36.00
RR. springs	31.00 to	32.00
Steel car axles	30.00 to	31.00
Stove plate	30.00 to	35.00
Grate bars	30.00 to	32.50
Brake shoes	25.00 to	26.00
Malleable	38.00 to	40.00
Cast iron carwheels	32.00 to	33.00
No. 1 mach'ery cast.	35.00 to	40.00
Breakable cast	27.50 to	30.00

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$27.00 to	$27.50
No. 2 hvy. melting	27.00 to	27.50
No. 2 bundles	27.00 to	27.50
No. 1 busheling	27.00 to	27.50
Long turnings	17.00 to	18.00
Shoveling turnings	18.00 to	19.00
Cast iron borings	17.00 to	18.00
Bar crops and plate	28.00 to	29.00
Structural and plate	28.00 to	29.00
No. 1 cast	34.00 to	38.00
Stove plate	30.00 to	35.00
Steel axles	29.00 to	30.00
Scrap rails	28.00 to	29.00
Rerolling rails	30.00 to	31.00
Angles & splice bars	30.00 to	31.00
Rails 3 ft & under	31.00 to	32.00
Cast iron carwheels	29.50 to	30.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$32.00 to	$32.50
No. 2 hvy. melting	32.00 to	32.50
Low phos. plate	34.00 to	34.50
No. 1 busheling	32.00 to	32.50
Hydraulic bundles	32.00 to	32.50
Mach. shop turn.	27.00 to	27.50
Short. shovel. turn.	27.00 to	27.50
Cast iron borings	27.00 to	27.50
Elec. furnace punch.	34.00 to	34.50

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	....	$26.50
No. 2 hvy. melting	....	26.50
Comp. black bundles	....	26.50
Comp. galv. bundles	....	23.50
Mach. shop turn.	....	20.50
Mixed bor. & turn.	....	20.50
Shoveling turn.	....	22.25
No. 1 cupola cast	$36.00 to	37.00
Hvy. breakable cast	32.00 to	35.00
Charging box cast	$36.00 to	$37.00
Stove plate	36.00 to	37.00
Clean auto cast.	36.00 to	37.00
Unstrip. motor blks.	25.00 to	27.00
Cl'n chem. cast bor.	....	19.33*

*Nominal at press time

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$28.50 to	$29.00
No. 1 bundles	28.50 to	29.00
No. 2 bundles	28.50 to	29.00
No. 2 hvy. melting	28.50 to	29.00
Mach. shop turn.	18.75 to	19.25
Shoveling turn.	20.75 to	21.25
Cast iron borings	19.75 to	20.25
Mixed bor. & turn.	18.75 to	19.25
No. 1 cupola cast	35.00 to	40.00
Charging box cast	....	30.00
Stove plate	30.00 to	35.00
Clean auto cast	35.00 to	40.00
Malleable	33.00 to	33.50
Low. phos. plate	31.00 to	32.00
Scrap rails	29.75 to	30.25
Rails 3 ft. & under	31.75 to	32.25
RR. steel wheels	32.75 to	33.25
Cast iron carwheels	31.00 to	31.50
RR. coil & leaf spgs.	32.75 to	33.25
RR. knuckles & coup.	32.75 to	33.25
No. 1 busheling	28.50 to	29.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$30.00 to	$30.50
No. 2 hvy. melting	30.00 to	30.50
Compressed sheet stl.	30.00 to	30.50
Drop forge flashings	30.00 to	30.50
No. 2 bundles	30.00 to	30.50
Mach. shop turn.	25.00 to	25.50
Short shovel	25.00 to	25.50
No. 1 busheling	30.00 to	30.50
Steel axle turn.	30.00 to	30.50
Cast iron borings	25.00 to	25.50
Mixed bor. & turn.	25.00 to	25.50
No. 1 machinery cast	37.50 to	40.00
Malleable	34.50 to	35.00
Railroad cast	37.50 to	40.00
Railroad grate bars	30.00 to	30.50
Stove plate	34.50 to	35.00
RR. hvy. melting	30.00 to	30.50
Rails 3 ft. & under	34.00 to	34.50
Rails 18 in. & under	36.00 to	36.50
Rails for rerolling	33.00 to	33.50
Elec. furnace punch	32.00 to	32.50

SAN FRANCISCO

Per gross ton delivered to consumer:

Cast grade f.o.b. shipping point

No. 1 hvy. melting	....	$19.50
No. 2 hvy. melting	....	19.50
No. 2 bales	....	19.50
No. 3 bales	....	16.00
Mach. shop turn.	....	13.00
Elec. furn. 1 ft. und.	....	19.50*
No. 1 cupola cast.	....	25.00*
RR. hvy. melting	....	20.50

LOS ANGELES

Per gross ton delivered to consumer:

Cast grade f.o.b. shipping point

No. 1 hvy. melting	....	$19.50
No. 2 hvy. melting	....	19.50
No. 1 bales	....	19.50
No. 2 bales	....	19.50
No. 3 bales	....	16.00
Mach. shop turn.	....	13.00
No. 1 cupola cast	....	25.00
RR. hvy. melting	....	20.50

SEATTLE

Per gross ton delivered to consumer:

Cast grade f.o.b. shipping point

No. 1 & No. 2 hvy. melting	....	$17.00
Elec. furn. 1 ft. und.	....	17.00
No. 1 cupola cast	....	25.00*
RR. hvy. melting	....	16.00

HAMILTON, ONT.

Per gross ton delivered to consumer:

Cast grades f.o.b. shipping point

Heavy melting	$17.50*
No. 1 bundles	17.50*
No. 2 bundles	17.00*
Mixed steel scrap	15.50*
Rails, remelting	18.50*
Rails, rerolling	21.50*
Bushelings	13.00*
Mixed borings & turnings	12.50*
Electric furnace bundles	20.50*
Manganese steel scrap	20.00*
No. 1 cast	19.00*
Stove plate	17.50*
Car wheels, cast	19.50*
Malleable iron	16.00*

Comparison of Prices . .

Advances over past week in **Heavy Type**, declines in *Italics*. Prices are f.o.b. major basing points. The various basing points for finished and semifinished steel are listed in the detailed price tables.

Flat-Rolled Steel: (cents per pound)	Dec. 24, 1946	Dec. 17, 1946	Nov. 19, 1946	Dec. 25, 1945
Hot-rolled sheets	2.50	2.50	2.425	2.20
Cold-rolled sheets	3.20	3.20	3.275	3.05
Galvanized sheets (10 ga.)	3.55	3.55	4.05	3.70
Hot-rolled strip	2.50	2.50	2.35	2.10
Cold-rolled strip	3.20	3.20	3.05	2.80
Plates	2.50	2.50	2.50	2.25
Plates, wrought iron	4.112	4.112	4.112	3.80
Stain's c-r strip (No. 302)	30.30	30.30	30.30	28.00
Tin and Terneplate: (dollars per base box)				
Tinplate, standard cokes..	$5.00	$5.00	$5.00	$5.00
Tinplate, electro (0.50 lb)	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (cents per pound)				
Merchant bars	2.60	2.60	2.50	2.25
Cold-finished bars	3.10	3.10	3.10	2.75
Alloy bars	3.05	2.92	2.92	2.70
Structural shapes	2.35	2.35	2.35	2.10
Stainless bars (No. 302)	25.97	25.97	25.97	24.00
Wrought iron bars	4.76	4.76	4.76	4.40
Wire and Wire Products: (cents per pound)				
Bright wire	3.05	3.05	3.05	2.75
Wire nails	3.75	3.75	3.75	2.90
Rails: (dollars per 100 lb)				
Heavy rails	$2.50	$2.50	$43.39†	$43.00*
Light rails	2.85	2.85	49.18†	45.00*
*per gross ton †per net ton				
Semifinished Steel: (dollars per gross ton)				
Rerolling billets	$39.00	$39.00	$39.00	$36.00
Sheet bars	38.00	38.00	38.00	36.00
Slabs, rerolling	39.00	39.00	39.00	36.00
Forging billets	47.00	47.00	47.00	42.00
Alloy blooms, billets, slabs	61.00	58.43	58.43	54.00
Wire Rods and Skelp: (cents per pound)				
Wire rods	2.55	2.30	2.30	2.15
Skelp	2.05	2.05	2.05	1.90

Pig Iron: (per gross ton)	Dec. 24, 1946	Dec. 17, 1946	Nov. 19, 1946	Dec. 25, 1945
No. 2, foundry, Phila.	$32.43	$32.43	$30.43	$27.59
No. 2, Valley furnace	30.50	30.50	28.50	25.75
No. 2, Southern, Cin'ti	29.80	29.80	27.80	26.19
No. 2, Birmingham	26.88	26.88	24.88	22.13
No. 2 foundry, Chicago†	30.50	30.50	28.50	25.75
Basic, del'd eastern Pa.	31.93	31.93	29.93	27.09
Basic, Valley furnace	30.00	30.00	28.00	25.25
Malleable, Chicago†	30.50	30.50	28.50	25.75
Malleable, Valley	30.50	30.50	28.50	25.75
Charcoal, Chicago	42.99	42.34	42.34	42.34
Ferromanganese‡	135.00	135.00	135.00	135.00

† The switching charge for delivery to foundries in the Chicago district is 60¢ per ton.
‡ For carlots at seaboard.

Scrap: (per gross ton)				
Heavy melt'g steel, P'gh.	$32.25	$30.25	$25.25	$20.00
Heavy melt'g steel, Phila.	31.00	29.00	24.50	18.75
Heavy melt'g steel, Ch'go	32.25	25.25	24.50	18.75
No. 1 hy. comp. sheet, Det.	28.50	22.32	22.32	17.32
Low phos. plate, Youngs'n	34.25	32.75	27.75	22.50
No. 1, cast, Pittsburgh	37.50	35.00	29.00	20.00
No. 1, cast, Philadelphia	41.50	40.50	39.00	20.00
No. 1, cast, Chicago	44.00	39.75	37.75	20.00
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$8.75	$8.75	$8.75	$7.50
Foundry coke, prompt	8.50	8.50	8.50	9.00
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro., Conn.	19.50	19.50	17.50	12.00
Copper, Lake, Conn.	19.625	19.625	17.50	12.00
Tin, Straits, New York	70.00	70.00	70.00	52.00
Zinc, East St. Louis	10.50	10.50	10.50	8.25
Lead, St. Louis	12.35	12.35	11.65	6.35
Aluminum, virgin	15.00	15.00	15.00	15.00
Nickel, electrolytic			35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	28.25	23.50	23.50	14.50

Composite Prices . .

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942 and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite prices for the current quarter are an estimate based on finished steel shipments for the previous quarter. These figures will be revised when the actual data of shipments for this quarter are compiled.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Dec. 24, 1946	2.75655¢ per lb.	$30.14 per gross ton	$31.83 per gross ton
One week ago	2.75655¢ per lb.	$30.14 per gross ton	$28.17 per gross ton
One month ago	2.70711¢ per lb.	$28.13 per gross ton	$24.75 per gross ton
One year ago	2.44104¢ per lb.	$25.37 per gross ton	$19.17 per gross ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1946	2.75655¢ Dec. 17	2.54490¢ Jan. 1	$30.14 Dec. 10	$25.37 Jan. 1	$31.83 Dec. 24	$19.17
1945	2.44104¢ Oct. 2	2.38444¢ Jan. 2	25.37 Oct. 23	$23.61	19.17 Jan. 2	$18.92 May 22
1944	2.30837¢ Sept. 5	2.21189¢ Oct. 5	$23.61	23.61	19.17 Jan. 11	15.76 Oct. 24
1943	2.29176¢	2.29176¢	23.61	23.61	$19.17	$19.17
1942	2.28249¢	2.28249¢	$23.61 Mar. 20	$23.45 Jan. 2	19.17	19.17
1941	2.43078¢	2.43078¢	23.45 Dec. 28	22.61 Jan. 2	$22.00 Jan. 7	$19.17 Apr. 10
1940	2.30467¢ Jan. 2	2.24107¢ Apr. 16	22.61 Sept. 19	20.61 Sept. 12	21.83 Dec. 30	16.04 Apr. 9
1939	2.35267¢ Jan. 3	2.26689¢ May 16	23.25 June 21	19.61 July 6	22.50 Oct. 3	14.08 May 16
1938	2.58414¢ Jan. 4	2.27207¢ Oct. 18	23.25 Mar. 9	20.25 Feb. 16	15.00 Nov. 22	11.00 June 7
1937	2.58414¢ Mar. 9	2.32263¢ Jan. 4	19.74 Nov. 24	18.73 Aug. 11	21.92 Mar. 30	12.67 June 9
1936	2.32263¢ Dec. 28	2.05200¢ Mar. 10	18.84 Nov. 5	17.83 May 14	17.75 Dec. 21	12.67 June 8
1935	2.07642¢ Oct. 1	2.06492¢ Jan. 8	17.90 May 1	16.90 Jan. 27	13.42 Dec. 10	10.33 Apr. 29
1934	2.15367¢ Apr. 24	1.95757¢ Jan. 2	16.90 Dec. 5	13.56 Jan. 3	13.00 Mar. 13	9.50 Sept. 25
1933	1.95578¢ Oct. 3	1.75836¢ May 2	14.81 Jan. 5	13.56 Dec. 6	12.25 Aug. 8	6.75 Jan. 3
1932	1.89196¢ July 5	1.83901¢ Mar. 1	15.90 Jan. 6	14.79 Dec. 15	8.50 Jan. 12	6.43 July 5
1931	1.99626¢ Jan. 13	1.86586¢ Dec. 29	18.21 Jan. 7	15.90 Dec. 16	11.33 Jan. 8	8.50 Dec. 29
1930	2.25488¢ Jan. 7	1.97319¢ Dec. 9	18.71 May 14	18.21 Dec. 17	15.00 Feb. 18	11.25 Dec. 9
1929	2.31773¢ May 28	2.26498¢ Oct. 29			17.58 Jan. 29	14.08 Dec. 3

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 pct of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia, and Chicago.

One of the two wheels above was in use for four months on a charging machine where it was daily subjected to repeated loadings of 300,000 pounds. Previously, regular carbon steel wheels would mushroom and have to be taken out of service in two weeks, thus presenting an expensive maintenance problem involving three men to make the replacement. A heat treated wheel of Jalloy steel was substituted and after four months' service removed for inspection. It is the wheel on the right. No appreciable wear can be seen when compared to the wheel beside it that was never in service. If you have an application that requires resistance to abrasion, fatigue and high impact strength write to us about heat treated Jalloy.

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH 30, PENNSYLVANIA

Iron and Steel Prices . . .

Steel prices shown here are f.o.b. basing points, in cents per pound or dollars per gross ton. Extras apply. Delivered prices do not reflect 3 pct tax on freight. (1) Commercial quality sheet grade; primes, 25¢ above base. (2) Commercial quality grade. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25¢ per 100 lb to fabricators. (8) Also shafting. For quantities of 20,000 lb to 39,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is not used. (11) Boxed. (12) This base price for annealed, bright finish wires, commercial spring wire. (13) Produced to dimensional tolerances in AISI Manual Sect. 6 (14) Billets only. (15) 9/32 in. to 47/64 in., 0.10¢ per lb higher.

Basing Points	Pitts-burgh	Chicago	Gary	Cleve-land	Birm-ingham	Buffalo	Youngs-town	Spar-rows Point	Granite City	Middle-town, Ohio	Gulf Ports, Cars	[10] Pacific Ports, Cars	DELIVERED TO Detroit	New York	Phila-delphia
INGOTS Carbon, rerolling	($33.00 f. o. b. mill)														
Carbon, forging	$38	$38	$38	$38	$38	$38	$38								
Alloy	$52.00	$52.00				$52.00	(Bethlehem, Massillon, Canton, Coatesville—$52.00)								
BILLETS, BLOOMS, SLABS Carbon, rerolling	$39	$39	$39	$39	$39	(Provo—$50.20, Duluth—$41[14]) $39	$39	$39				$51.50[14]	$41.50		
Carbon, forging billets	$47	$47	$47	$47	$47	(Provo—$58.20, Duluth—$49[14]) $47	$47					$59.50[14]	$49.50		
Alloy	$61.00	$61.00				$61.00	(Bethlehem, Massillon, Canton—$61.00)						$63.50		
SHEET BARS	$38	$38		$38		$38	$38	$38	(Canton—$38)						
PIPE SKELP	2.05¢	2.05¢					2.05¢	2.05¢	(Coatesville—2.05¢)						
WIRE RODS [15] No. 5 to 9/32 in.	2.55¢	2.55¢		2.55¢	2.55¢	(Worcester—2.65¢)					2.835¢	3.385¢			
SHEETS Hot-rolled	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.875¢	2.50¢		3.085¢	2.635¢	2.76¢	2.69¢
Cold-rolled [1]	3.20¢	3.20¢	3.20¢	3.20¢		3.20¢	3.20¢		3.30¢			3.885¢	3.335¢	3.560¢	3.560¢
Galvanized (10 gage)	3.55¢	3.55¢	3.55¢		3.55¢	3.55¢	3.55¢	3.55¢	3.65¢			4.135¢		3.81¢	3.74¢
Enameling (12 gage)	3.55¢	3.55¢	3.55¢	3.55¢			3.55¢		3.65¢			4.235¢	3.685¢	3.95¢	3.91¢
Long ternes [2] (10 gage)	3.55¢	3.55¢	3.55¢									4.335¢		3.95¢	3.91¢
STRIP Hot-rolled [3]	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢		2.50¢			2.50¢		3.185¢	2.635¢	2.90¢	2.86¢
Cold-rolled [4]	3.20¢	3.30¢		3.20¢			3.20¢						3.335¢	3.60¢	3.56¢
Cooperage stock	2.55¢	2.55¢			2.55¢		2.55¢							2.95¢	
TINPLATE Standard cokes, base box	$5.00	$5.00	$5.00		$5.10			$5.10	$5.10					$5.375	$5.301[11]
Electro, box 0.25 lb	Deduct 85¢ from standard coke base box price.														
Electro, box 0.50 lb	Deduct 50¢ from standard coke base box price.														
Electro, box 0.75 lb	Deduct 35¢ from standard coke base box price.														
BLACKPLATE 29 gage [5]	3.30¢	3.30¢	3.30¢		3.40¢			3.40¢	3.40¢					3.67¢	3.59¢
TERNES, MFG. Special coated, base box	Deduct 70¢ from standard coke base box price.														
CAN MAKING QUALITY Blackplate 55 to 70 lb	Deduct $1.30 from standard coke base box price.														
BARS Carbon steel	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	(Duluth—2.70¢) (Provo, Utah—3.30¢)			2.985¢	3.285¢	2.735¢	2.94¢	2.96¢
Rail steel [6]	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢					3.135¢	3.435¢			
Reinforcing (billet) [7]	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢			2.835¢	2.885¢	2.585¢	2.71¢	2.79¢
Reinforcing (rail) [7]	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢				2.985¢	3.035¢	2.735¢		
Cold-finished [8]	3.10¢	3.10¢	3.10¢	3.10¢		3.10¢	(Detroit—3.15¢) (Toledo—3.25¢)							3.44¢	3.46¢
Alloy, hot-rolled	3.05¢	3.05¢				3.05¢	3.05¢	(Bethlehem, Massillon, Canton—3.05¢)					3.185¢		
Alloy, cold-drawn	3.62¢	3.62¢	3.62¢	3.62¢		3.62¢							3.785¢		
PLATE Carbon steel [13]	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢		2.50¢	(Coatesville, Claymont—2.50¢ Geneva Utah—2.65¢) 2.50¢			2.885¢	3.085¢	2.755¢	2.71¢	2.556¢
Floor plates	3.75¢	3.75¢									4.135¢	4.435¢		4.15¢	4.15¢
Alloy	3.79¢	3.79¢			(Coatesville—3.79¢)						4.305¢	4.525¢		4.01¢	3.895¢
SHAPES Structural	2.35¢	2.35¢	2.35¢		2.35¢	2.35¢	(Geneva, Utah—2.50¢) (Bethlehem—2.35¢)				2.735¢	3.035¢		2.54¢	2.48¢
SPRING STEEL, C-R 0.26 to 0.50 carbon	3.55¢			3.55¢			(Worcester—3.75¢)								
0.51 to 0.75 carbon	4.80¢			4.80¢			(Worcester—5.00¢)								
0.76 to 1.00 carbon	6.65¢			6.65¢			(Worcester—6.85¢)								
1.01 to 1.25 carbon	8.85¢			8.85¢			(Worcester—9.05¢)								
WIRE [9] Bright [12]	3.05¢	3.05¢		3.05¢	3.05¢		(Worcester—3.15¢) (Duluth—3.10¢)					3.585¢		3.44¢	3.41¢
Galvanized	Add proper size extra and galvanizing extra to Bright Wire Base														
Spring (high carbon)	4.00¢	4.00¢		4.00¢			(Worcester—4.10¢)			(Trenton—4.25¢)		4.535¢		4.39¢	4.339¢
PILING Steel sheet	2.65¢	2.65¢				2.65¢						3.235¢		2.99¢	3.01¢

CORROSION AND HEAT RESISTANT STEELS

In cents per pound, f.o.b. basing point

BASING POINT	Chromium Nickel		Straight Chromium			
	No. 304	No. 302	No. 410	No. 430	No. 442	No. 446
Ingot, P'gh, Chi, Canton, Balt, Reading, Ft. Wayne, Phila.	Subject to negotiation			Subject to negotiation		
Blooms, P'gh, Chi, Canton, Phila, Reading, Ft. Wayne, Balt.	22.99	24.67	17.01	17.47	20.69	25.29
Slabs, P'gh, Chi, Canton, Balt, Phila, Reading	22.99	24.67	17.01	17.47	20.69	25.29
Billets, P'gh, Chi, Canton, Watervliet, Syracuse, Balt.	Subject to negotiation			Subject to negotiation		
Billets, forging, P'gh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Watervliet, Syracuse, Ft. Wayne, Titusville	22.99	24.67	17.01	17.47	20.69	25.29
Bars, h-r, P'gh, Chi, Canton, Dunkirk, Watervliet, Syracuse, Balt, Phila, Reading, Ft. Wayne, Titusville	27.05	25.97	20.02	20.56	24.34	29.75
Bars, c-f, P'gh, Chi, Cleve, Canton, Dunkirk, Syracuse, Balt, Phila, Reading Ft. Wayne, Watervliet	27.05	25.97	20.02	20.56	24.34	29.75
Plates, P'gh, Middletown, Canton	31.38	29.21	23.28	23.80	28.67	33.00
Shapes, structural, P'gh, Chi	27.05	25.97	20.02	20.56	24.34	29.75
Sheets, P'gh, Chi, Middletown, Canton, Balt	38.95	36.79	28.67	31.38	35.16	38.49
Strip h-r, P'gh, Chi, Reading, Canton, Youngstown	25.43	23.28	18.39	18.93	25.97	37.87
Strip, c-r, P'gh, Cleve, Newark, N. J., Reading, Canton, Youngstown	32.46	30.30	23.80	24.34	34.62	56.26
Wire, c-d, Cleve, Dunkirk, Syracuse, Balt, Reading, Canton, P'gh, Newark, N. J., Phila.	27.05	25.97	20.02	20.56	24.34	29.75
Wire, flat, c-r, Cleve, Balt, Reading, Dunkirk, Canton	32.46	30.30	23.80	24.34	34.62	56.26
Rod, h-r, Syracuse	27.05	25.97	20.02	20.56	24.34	29.75
Tubing, seamless, P'gh, Chi, Canton, (4 to 6 in.)	72.09	72.09	.....	68.49	.....	.....

TOOL STEEL

*(F.o.b. Pittsburgh, Bethlehem, Syracuse, Dunkirk. *Also Canton, O.)*

An increase of 8.2 pct applies to base price and extras

	Base per lb
High speed	67¢
Straight molybdenum	54¢
Tungsten-molybdenum	57½¢
High-carbon-chromium*	43¢
Oil hardening*	24¢
Special carbon*	22¢
Extra carbon*	18¢
Regular carbon*	14¢

Warehouse prices on and east of Mississippi are 2¢ per lb higher; west of Mississippi 3¢ higher.

ELECTRICAL SHEETS

Base, all grades f.o.b. Pittsburgh

	per lb
Field grade	3.90¢
Armature	4.25¢
Electrical	4.75¢
Motor	5.425¢
Dynamo	6.125¢
Transformer 72	6.625¢
Transformer 65	7.625¢
Transformer 58	8.125¢
Transformer 52	8.925¢

F.o.b. Chicago and Gary, field grade through motor; f.o.b. Granite City, add 10¢ per 100 lb on field grade to and including dynamo. Pacific ports add 75¢ per 100 lb on all grades.

RAILS, TRACK SUPPLIES

(F.o.b. mill)

Standard rails, heavier than 60 lb	
No. 1 O.H., per 100 lb	$2.50
Angle splice bars, 100 lb	3.00
(F.o.b. basing points)	*per 100 lb*
Light rails (from billets)	$2.85
Light rails (from rail steel)	2.75

	Base per lb
Cut spikes	4.50¢
Screw spikes	6.40¢
Tie plate, steel	2.80¢
Tie plates, Pacific Coast	2.95¢
Track bolts	6.50¢
Track bolts, heat treated, to rail roads	6.75¢
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25¢.

ROOFING TERNEPLATE

(F.o.b. Pittsburgh, 112 sheets)

	20x14 in.	20x28 in.
8-lb coating I.C.	$6.25	$12.50

CLAD STEEL

Base prices, cents per pound

	Plate	Sheet
Stainless-clad		
No. 304, 20 pct, f.o.b. Pittsburgh, Washington, Pa.	21.00*	22.00
Nickel-clad		
10 pct, f.o.b. Coatesville, Pa.	18.72	....
Inconel-clad		
10 pct, f.o.b. Coatesville	26.00	....
Monel-clad		
10 pct, f.o.b. Coatesville	24.96	....
Aluminized steel		
Hot dip, 20 gage, f.o.b. Pittsburgh	....	9.00

*Includes annealing and pickling.

WIRE PRODUCTS

To the dealer f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Basing Points Named	Pacific Coast Basing Points†
	base per keg	
Standard, galvanized and coated nails	$3.75	$4.25
Cut nails, carloads	4.85	....
	base per 100 lb	
Annealed fence wire	$3.75	$4.00
Annealed galv. fence wire	3.85	4.35
	base column	
Woven wire fence*	79	97
Fence posts, carloads	74	91
Single hoop bale ties	73	98
Galvanized barbed wire**	89	99
Twisted barbless wire	79	89

*15½ gage and heavier. **On 80-rod spools in carload quantities.

†Prices subject to switching or transportation charges.

HIGH TENSILE, LOW ALLOY STEELS

base prices, cents per pound

Steel	Aldecor	Corten	Double Strength No. 1	Dynalloy	HI Steel	Mayari R	Otis-coloy	Yoloy	Y-50
Producer	Republic	Carnegie-Illinois, Republic	Republic	Alan Wood	Inland	Bethlehem	Jones & Laughlin	Youngstown Sheet & Tube	American Rolling Mill
Plates	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45	.....
Sheets									
Hot-rolled	3.575	3.575	3.575	3.575	3.575	3.575	3.575	3.575	.....
Cold-rolled	4.525	4.525	4.525	.....	4.525	4.525	4.525	4.525	5.225*
Galvanized	.....	.....	.....	.....	.....	5.50	.....	.....	.....
Strip									
Hot-rolled									
Over 6-in.	3.60	3.60	3.60	.....	3.60	3.60	3.60	3.60	.....
6-in & under	3.70	3.70	3.70	.....	3.70	3.70	3.70	3.70	.....
Cold-rolled	4.30	.....	4.30	.....	4.40	.....	4.30	4.30	5.00*
Commodity	.....	.....	.....	.....	.....	.....	4.45	.....	.....
Shapes	.....	3.45	.....	.....	3.45	3.45	3.45	3.45	.....
Beams	.....	3.45	.....	.....	.....	3.45	.....	.....	.....
Bars									
Hot-rolled	3.70	3.70	3.70	.....	.....	3.70	3.70	3.732†‡	.....
Cold-rolled	.....	.....	.....	.....	.....	.....	.....	4.382†‡	.....
Bar shapes	.....	3.85	.....	.....	3.85	3.85	3.85	3.85	.....
Billets, blooms, slabs (per gross ton)									
Structural	.....	.....	.....	.....	.....	.....	.....	$74.65†	.....
Forging	.....	.....	.....	.....	.....	.....	.....	$82.23†	.....

* 21 gage and lighter. † Alloy extras apply. ‡ Add 0.379¢ for forging or heat treating grade.

WELDED PIPE AND TUBING

Base discounts, f.o.b. Pittsburgh district and Lorain, Ohio, mills

(F.o.b. Pittsburgh only on wrought pipe)
Base price—$200.00 per net ton

Steel (buttweld)

	Black	Galv.
½-in.	60½	48
¾-in.	63½	52
1-in. to 3-in.	65½	54½

Wrought Iron (buttweld)

½-in.	17⅞	+4⅜
¾-in.	24¼	2⅝
1-in. and 1¼-in.	28⅝	9⅛
1½-in.	33	11⅞
2-in.	32⅜	11⅜

Steel (lapweld)

2-in	58	46½
2½-in. and 3-in.	61	49½
3½-in. to 6-in.	63	51½

Wrought Iron (lapweld)

2-in.	24⅞	4⅞
2½-in. to 3½-in.	25⅞	7½
4-in.	28⅛	11⅜
4½-in. to 8-in.	27	10¼

Steel (butt, extra strong, plain ends)

½-in.	58½	47½
¾-in.	62½	51½
1-in. to 3-in.	64	54

Wrought Iron (same as above)

½-in.	18⅞	+1⅝
¾-in.	25⅜	4¾
1-in. to 2-in.	33	13

Steel (lap, extra strong, plain ends)

2-in.	56	45½
2½-in. and 3-in.	60	49½
3½-in. to 6-in.	63½	53

Wrought Iron (same as above)

2-in.	28⅛	8⅝
2½-in. to 4-in.	34	16¼
4½-in. to 6-in.	32⅜	14⅝

On buttweld and lapweld steel pipe jobbers are granted a discount of 5 pct. On l.c.l. shipments prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lapweld and one point lower discount, or $2 a ton higher on all buttweld.

BOILER TUBES

Seamless steel and lapweld commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft f.o.b. Pittsburgh, in carload lots

	Seamless Cold-Drawn	Seamless Hot-Rolled	Lapweld, Hot-Rolled
2 in. O.D. 13 B.W.G.	16.52	13.90	13.20
2½ in. O.D. 12 B.W.G.	22.21	18.70	17.67
3 in. O.D. 12 B.W.G.	24.71	20.79	19.56
3½ in. O.D. 11 B.W.G.	31.18	26.25	24.68
4 in. O.D. 10 B.W.G.	38.68	32.56	30.55

(Extras for less carload quantities)

40,000 lb or ft and over	Base
30,000 lb or ft to 39,999 lb or ft	5 pct
20,000 lb or ft to 29,999 lb or ft	10 pct
10,000 lb or ft to 19,999 lb or ft	20 pct
5,000 lb or ft to 9,999 lb or ft	30 pct
2,000 lb or ft to 4,999 lb or ft	45 pct
Under 2,000 lb or ft	65 pct

CAST IRON WATER PIPE

	Per net ton
6-in. to 24-in., del'd Chicago	$74.33
6-in. to 24-in., del'd New York	73.60
6-in. to 24-in., Birmingham	65.00
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles or Seattle for all rail shipment; rail and water shipment less	88.40

Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts

Add 18 pct for bolts up to ⅝ in. diam and 6 in. long. In larger sizes, add 15 pct.

Base discount less case lots

	Percent Off List
½ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1⅛ in. and larger, all lengths	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed
(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifin. Hexagon Nuts	U.S.S.	S.A.E.
Base discount less keg lots		
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 in. through 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full keg lots, 10 pct additional discount. For 200 lb or more, freight allowed up to 50¢ per 100 lb, based on Cleveland, Chicago, Pittsburgh.

Stove Bolts

	Consumer
Packages, nuts loose	71 and 10
In packages	71
In bulk	80

On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.

Large Rivets
(½ in. and larger)

	Base per 100 Lb
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$4.75
F.o.b. Lebanon, Pa.	4.90

Small Rivets
(7/16 in. and smaller)

	Percent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	55 and 5

Cap and Set Screws *(In packages)*	Percent Off List Consumer
Upset full fin, hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Fillister head cap, listed sizes	51

Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Effective CaF_2 Content:	Base price per short ton
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports)

	Per Gross Ton
Old range, bessemer	$5.45
Old range, non-bessemer	5.30
Mesabi, bessemer	5.20
Mesabi, non-bessemer	5.05
High phosphorus	5.05

Prices are for ore shipped on and after June 24, 1946, and for ore covered by adjustable pricing agreements authorized by Order No. 8, RMPR 113.

These prices do not reflect the recent ICC increase in freight rates.

METAL POWDERS

Prices in cents per pound in ton lots, f.o.b. shipping point.

Brass, minus 100 mesh	23¢ to 27¢
Copper, electrolytic, 100 and 375 mesh	28⅝¢ to 30⅝¢
Copper, reduced, 150 and 200 mesh	22⅜¢
Iron, commercial, 100, 200, 325, mesh 96 + % Fe	11¢ to 16¢
Swedish sponge iron, 100 mesh, c.i.f. N. Y., carlots, ocean bags	7.4¢ to 8¢
Iron, crushed, 200 mesh and finer, 90 + % Fe carload lots	5¢
Iron, hydrogen reduced, 300 mesh and finer, 98 + % Fe, drum lots	66¢
Iron, electrolytic, unannealed, 325 mesh and coarser, 99 + % Fe	25¢ to 31¢
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	17¢
Iron carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90¢ to $1.75
Aluminum, 100, 200 mesh, carlots	25¢
Antimony, 100 mesh	39¢
Cadmium, 100 mesh	$2.00
Chromium, 100 mesh and finer	$1.25
Lead, 100, 200 & 300 mesh	17.55¢ to 21.05¢
Manganese, minus 325 mesh and coarser	44¢ to 61¢
Nickel, 150 mesh	51½¢
Silicon, minus 325 mesh and coarser	26¢ to 55¢
Solder powder, 100 mesh	8½¢ plus metal
Tin, 100 mesh	58¾¢
Tungsten metal powder, 98%-99%, any quantity, per lb	$2.60
Molybdenum powder, 99%, in 100-lb kegs, f.o.b. York, Pa., per lb	$2.65
Under 100 lb	$2.90

COKE

	Net Ton
Furnace, beehive (f.o.b. oven)	
Connellsville, Pa.	$8.75
Connellsville, Pa., hand drawn	9.35
Foundry, beehive (f.o.b. oven)	
Connellsville, Pa.	8.50
Foundry, Byproduct	
Chicago, del'd	15.10
Chicago, f.o.b.	14.35
New England, del'd	16.04
Kearny, N. J., f.o.b.	14.40
Philadelphia, del'd	14.62
Buffalo, del'd	14.75
Portsmouth, Ohio, f.o.b.	12.85
Painesville, Ohio, f.o.b.	13.50
Erie, del'd	14.50
Cleveland, del'd	14.55
Cincinnati, del'd	14.60
St. Louis, del'd	15.10†
Birmingham, del'd	12.25

†Except producers situated in states other than Missouri, Alabama or Tennessee, sellers may charge a maximum delivered price of $15.60 in the St. Louis Mo., and East St. Louis, Ill., switching districts.

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

	Carloads Per 1000
Sec. quality, Ohio	57.00
First quality, Pa., Md., Ky., Mo., Ill., Ohio	65.00
First quality, New Jersey	70.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	59.00
Sec. quality, New Jersey	62.00
Sec. quality, Ohio	57.00
Ground fire clay, net ton, bulk	9.50

Silica Brick

Pennsylvania and Birmingham	$65.00
Chicago District	74.00
Silica cement, net ton (Eastern)	11.50
Chicago	12.50

Chrome Brick	Per Net Ton
Standard chemically bonded, Balt., Plymouth Meeting, Chester	$54.00

Magnesite Brick

Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester in sacks	$44.50
Domestic, f.o.b. Chewelah, Wash., in bulk	22.00
in sacks	26.00
Clinker (dead burned) dolomite, bulk, per net ton, f.o.b. York, Pa.	10.05

Midwest, add 10¢; Mo. Valley, add 20¢

WAREHOUSE PRICES

Delivered metropolitan areas, per 100 lb.

Cities	SHEETS			STRIP			Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot-Rolled (10 gage)	Cold-Rolled	Galvanized (24 gage)	Hot-Rolled 6 in. and Under	Hot-Rolled Over 6 in.	Cold-Rolled			Hot-Rolled	Cold-Finished	Hot-Rolled, A-8617-20	Hot-Rolled, A-8742-50 Ann.	Cold-Drawn, A-8617-20	Cold-Drawn, A-8742-50 Ann.
**Philadelphia	$3.774	$5.139	$5.249[a]	$4.314	$4.214	$5.064	$3.875	$3.937	$4.114	$4.564	$6.287	$7.387	$7.664	$8.764
New York	3.856	4.869	5.501	4.375	4.275	5.075	4.049	4.038	4.134	4.584	6.338	7.438	7.684	8.784
Boston	4.05	5.031	5.725	4.518	4.418	4.985	4.203	4.023	4.356	4.656	6.503	7.603	7.756	8.856
Baltimore	3.64	5.118	5.365	4.293	4.193	....	3.865	4.05	4.093	4.543	....	....	....	....
Norfolk	4.037	....	5.862	4.577	4.477	....	4.262	4.303	4.377	4.677	....	....	....	....
Chicago	3.475	4.425	5.40	3.95	3.85	4.90[5]	3.80	....	3.75	4.20	6.05	7.15	7.20	8.30
Milwaukee	3.633	4.583	5.558	4.108	4.008	5.058[5]	3.958	3.958	3.908	4.358	6.308	7.408	7.458	8.558
Cleveland	3.575	....	5.347	3.95	3.85	....	3.65	3.88	3.60	4.20	6.277	7.377	7.20	8.30
Buffalo	3.575	4.625	5.20	4.211	4.111	4.961	3.921	3.65	3.60	4.20	6.05	7.15	7.20	8.30
Detroit	3.71	4.76	5.526	4.085	3.985	4.95	3.935	3.987	3.735	4.285	6.456	7.556	7.585	8.685
Cincinnati	3.671	4.721	5.296	4.046	3.946	5.002	3.952	3.983	3.902	4.502	6.441	7.541	7.602	8.702
St. Louis	3.643	4.593	5.622	4.118	4.018	5.222	3.968	3.968	3.918	4.522	6.472	7.572	7.622	8.722
Pittsburgh	3.575	4.625	5.20	3.95	3.85	4.70	3.65	3.65	3.60	4.20	6.05	7.15	7.20	8.30
St. Paul	3.817	4.767	5.666	4.292	4.192	5.000	4.142	4.142	4.092	4.852	....	6.322	7.952	8.052
Duluth	3.817	4.767	5.666	4.292	4.192	....	4.142	4.142	4.092	....	6.472	6.572	....	....
Omaha	4.045	5.72	6.00	4.52	4.42	....	4.37	4.37	4.32	4.945	....	....	....	....
Indianapolis	3.775	4.825	5.40	4.15	4.05	5.03	3.92	3.92	3.87	4.47	6.17	....	7.32	....
Birmingham	3.675	....	5.20	4.05	3.95	....	3.80	3.80	3.75	4.954	6.414	7.514	7.564	8.614
Memphis	4.221	....	5.746	4.596	4.496	....	4.346	4.346	4.296	4.821	....	....	....	....
New Orleans	4.359*	5.40[1]	5.884	4.734	4.634	....	4.484	4.484*	4.434*	5.175	....	....	....	....
Los Angeles	4.885	6.635[1]	5.585	5.335	5.235	....	4.835	4.735	4.685	6.065	....	....	....	....
San Francisco	4.435	6.035	6.585	4.885	4.785	....	4.535	4.385	4.435	5.815	....	....	....	....
Seattle	4.905[4]	7.305[2]	6.435	4.635	4.535	....	5.035[4]	4.735[4]	4.635[4]	6.265	7.735[6]	8.735[6]	....	9.585[6]
Portland	4.905[3]	....	6.235	5.135	....	....	5.035[3]	4.735[3]	4.735[3]	6.015	7.735	8.885	....	....
Salt Lake City	4.81	....	6.70	5.94	5.84	....	5.29	5.29	5.19	6.49	....	....	....	....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED: Sheets, 400 to 1999 lb; strip, extras on all quantities; bars, 1500 lb base.

ALLOY BARS: 1000 to 39,999 lb.

GALVANIZED SHEETS: 450 to 1499 lb.

EXCEPTIONS: (1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 300 to 4999 lb; (4) 300 to 10,000 lb; (5) 2000 lb and over; (6) 1000 lb and over.

(a) Philadelphia: Galvanized sheet, 25 or more bundles.

* Add 29.1¢ for sizes not rolled in Birmingham.

** City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

PIG IRON PRICES

Dollars per gross ton.

BASING POINT PRICES

Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	31.00	31.50	32.00	32.50	.....
Birdsboro	31.00	31.50	32.00	32.50	36.00
Birmingham	26.38	26.88	.....	.....	.....
Buffalo	30.00	30.50	31.00	31.50	36.00
Chicago	30.00	30.50	30.50	31.00	.....
Cleveland	30.00	30.50	30.50	31.00	.....
Detroit	30.00	30.50	30.50	31.00	.....
Duluth	30.50	31.00	31.00	31.50	.....
Erie	30.00	30.50	31.00	31.50	.....
Everett	29.00	29.50	30.00	30.50	.....
Granite City	30.00	30.50	30.50	31.00	.....
Hamilton	28.00	28.50	28.50	.....	.....
Neville Island	30.00	30.50	30.50	31.00	.....
Provo	30.00	30.50	.....	.....	.....
Sharpsville	30.00	30.50	30.50	31.00	.....
Sparrows Point	31.00	31.50	.....	.....	.....
Steelton	31.00	.....	.....	.....	36.00
Swedeland	31.00	31.50	32.00	32.50	.....
Toledo	30.00	30.50	30.50	31.00	.....
Youngstown[1]	30.00	30.50	30.50	31.00	.....

DELIVERED PRICES (BASE GRADES)

Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Boston	Everett*	$0.50 Arb.	29.50	30.00	30.50	31.00	.....
Boston	Birdsboro-Steelton	4.47	.....	.....	.....	.....	40.47
Brooklyn	Bethlehem	2.78	33.78	34.28	34.78	35.28	.....
Brooklyn	Birdsboro	3.26	.....	.....	.....	.....	39.26
Canton	Clev., Ygstn., Sharpsville	1.54	31.54	32.04	32.04	32.54	.....
Canton	Buffalo	3.55	.....	.....	.....	.....	39.55
Cincinnati	Birmingham	4.30	30.68	31.18	.....	.....	.....
Cincinnati	Hamilton	1.24	.....	.....	29.74	.....	.....
Cincinnati	Buffalo	4.89	.....	.....	.....	.....	40.89
Jersey City	Bethlehem	1.70	32.70	33.20	33.70	34.20	.....
Jersey City	Birdsboro	2.16	.....	.....	.....	.....	38.16
Los Angeles	Provo	5.25	35.25	35.75	.....	.....	.....
Los Angeles	Buffalo	16.33	.....	.....	.....	.....	52.33
Mansfield	Cleveland-Toledo	2.16	32.16	32.66	32.66	33.16	.....
Mansfield	Buffalo	3.74	.....	.....	.....	.....	39.74
Philadelphia	Swedeland	0.93	31.93	32.43	32.93	33.43	.....
Philadelphia	Birdsboro	1.38	.....	.....	.....	.....	37.38
San Francisco	Provo	5.25	35.25	35.75	.....	.....	.....
San Francisco	Buffalo	16.33	.....	.....	.....	.....	52.33
Seattle	Provo	5.25	35.25	35.75	.....	.....	.....
Seattle	Buffalo	16.33	.....	.....	.....	.....	52.33
St. Louis	Granite City	0.50 Arb.	30.50	31.00	31.00	31.50	.....
St. Louis	Buffalo	7.86	.....	.....	.....	.....	43.86

(1) Struthers Iron & Steel Co., Struthers, Ohio, charges 50¢ per ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

Charcoal pig iron base price for low phosphorous $37.50 per gross ton, f.o.b. Lyles, Tenn. Delivered to Chicago, $42.99. High phosphorous charcoal pig iron is not being produced.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over; manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron silicon 6.00 to 6.50 pct, C/L per g.t., f.o.b. Jackson Ohio—$36.00; f.o.b. Buffalo—$37.25. Add $1.00 per ton for each additional 0.50 pct Si. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for 0.75 pct or more P. Bessemer ferrosilicon prices are $1.00 per ton above silvery iron prices of comparable analysis.

Ferromanganese

78-82% Mn, maximum contract base price, gross ton, lump size, f.o.b. Baltimore, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Less ton lots (packed)	148.50
F.o.b. Pittsburgh	139.50

$1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Briquets—cents per pound of briquet, freight allowed, 66% contained Mn.

	Eastern	Central	Western
Carload, bulk	6.05	6.30	6.60
Ton lots	6.65	7.55	8.55
Less ton lots	6.80	7.80	8.80

Spiegeleisen

Contract prices, gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$39.00	$40.00
F.o.b. Pittsburgh, Chicago	44.00	

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, f.o.b. shipping point, freight allowed, eastern zone.

96% min. Mn, 0.2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	30
L.c.l. lots	32

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	32
Ton lots	34
Less ton lots	36

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, f.o.b. shipping point, freight allowed, eastern zone.

	Carloads	Ton	Less
0.10% max. C, 0.06% P, 90% Mn	21.00	21.40	21.65
0.10% max. C	20.50	20.90	21.15
0.15% max. C	20.00	20.40	20.65
0.30% max. C	19.50	19.90	20.15
0.50% max. C	19.00	19.40	19.65
0.75% max. C, 7.00% max. Si	16.00	16.40	16.65

Silicomanganese

Contract basis, lump size, cents per pound of metal, f.o.b. shipping point, freight allowed. 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.05
Ton lots	6.70
Briquet, contract basis, carlots, bulk freight allowed, per lb of briquet	5.90
Ton lots	6.30
Less ton lots	6.55

Silvery Iron (electric furnace)

Si 14.01 to 14.50%, $53.25 f.o.b. Keokuk, Iowa; $50.00 f.o.b. Jackson, Ohio; $51.25 f.o.b. Niagara Falls. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 per ton for low impurities, not to exceed: P—0.05%, S—0.04%, C—1.00%.

Silicon Metal

Contract price, cents per pound contained Si, lump size, f.o.b. shipping point, freight allowed, for ton lots packed.

	Eastern	Central	Western
96% Si, 2% Fe	13.10	13.55	16.50
97% Si, 1% Fe	13.45	13.90	16.80

Ferrosilicon Briquets

Contract price, cents per pound of briquet, bulk, f.o.b. shipping point, freight allowed to destination, 40% Si.

	Eastern	Central	Western
Carload, bulk	3.60	3.75	3.90
Ton lots	4.15	4.55	4.60
Less ton lots	4.40	4.80	4.85

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
50% Si	7.05	7.50	7.65
75% Si	8.55	8.70	9.25
80-90% Si	9.50	9.65	10.15
90-95% Si	11.80	11.95	12.40

Ferrochrome (65-72% Cr, 2% max. Si)

Contract prices, cents per pound, contained Cr, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
0.06% C	23.00	23.40	24.00
0.10% C	22.50	22.90	23.50
0.15% C	22.00	22.40	23.00
0.20% C	21.50	21.90	22.50
0.50% C	21.00	21.40	22.00
1.00% C	20.50	20.90	21.50
2.00% C	19.50	19.90	20.50
65-69% Cr, 4-10% C	14.50	14.90	15.00
62-66% Cr, 5-7% C	15.05	15.45	15.55

Briquets—contract price, cents per pound of briquet, f.o.b. shipping point, freight allowed, 60% chromium.

	Eastern	Central	Western
Carload, bulk	9.20	9.50	9.90
Ton lots	9.80	10.30	11.80
Less ton lots	10.10	10.60	12.10

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N. High carbon type: 66.71% Cr, 4.5% C, 0.75% N. Add 5¢ per lb to regular high carbon ferrochrome price schedule.

S. M. Ferrochrome

Contract price, cents per pound chromium contained, lump size, f.o.b. shipping point, freight allowed.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

	Eastern	Central	Western
Carload	15.60	16.00	16.10
Ton lots	16.65	17.30	18.50
Less ton lots	17.30	17.95	19.15

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.

	Eastern	Central	Western
Carload	20.00	20.40	21.00
Ton lots	21.00	21.65	22.85
Less ton lots	22.00	22.65	23.85

Chromium Metal

Contract prices, cents per lb, chromium contained, carload, f.o.b. shipping point, freight allowed. 97% min. Cr, 1% max. Fe.

	Eastern	Central	Western
0.20% max. C	83.50	85.00	86.25
0.50% max. C	79.50	81.00	82.25
9.00% min. C	79.50	81.00	82.25

Chromium—Copper

Contract price, cents per pound of alloy, f.o.b. Niagara Falls, freight allowed east of the Mississippi. 8-11% Cr, 88-90% Cu, 1.00% max. Fe, 0.50% max. Si.

Shot or ingot	45¢

Calcium—Silicon

Contract price per lb of alloy, lump, f.o.b. shipping point, freight allowed.

30-35% Ca, 60-65% Si, 3.00% max. Fe or 28-32% Ca, 60-65% Si, 6.00% max. Fe.

	Eastern	Central	Western
Carloads	13.00	13.50	15.55
Ton lots	14.50	15.25	17.40
Less ton lots	15.50	16.25	18.40

Calcium—Manganese—Silicon

Contract prices, cents per lb of alloy, lump, f.o.b. shipping point, freight allowed.

16-20% Ca, 14-18% Mn, 53-59% Si.

	Eastern	Central	Western
Carloads	15.50	16.00	18.05
Ton lots	16.50	17.35	19.10
Less ton lots	17.00	17.85	19.60

Calcium Metal

Eastern zone contract prices, cents per pound of metal, f.o.b. shipping point, freight allowed. Add 1¢ for central zone; 5¢ for western zone.

	Cast	Turnings	Distilled
Ton lots	$1.35	$1.75	$4.25
Less ton lots	1.60	2.00	5.00

CMSZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.

	Eastern	Central	Western
Ton lots	12.00	12.75	14.75
Less ton lots	12.50	13.25	15.25

Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.

Ton lots	11.75	12.50	14.50
Less ton lots	12.25	13.00	15.00

SMZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed. 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe.

	Eastern	Central	Western
Ton lots	12.00	12.85	14.60
Less ton lots	12.50	13.35	15.10

Other Ferroalloys

Ferrotungsten, standard, lump or ¼X down, packed, f.o.b. plant Niagara Falls, Washington, Pa., York, Pa., per pound contained T, 5 ton lots, freight allowed	$1.88
Ferrovanadium, 35-55%, contract basis, f.o.b. plant, freight allowances, per pound contained V.	
Openhearth	$2.70
Crucible	$2.80
High speed steel (Primos)	$2.90
Vanadium pentoxide, 88-92% V_2O_5 technical grade, contract basis, per pound contained V_2O_5	$1.10
Ferrocolumbium, 50-60%, contract basis, f.o.b. plant, freight allowed, per pound contained Cb.	
Ton lots	$2.25
Less ton lots	$2.30
Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo	95¢
Calcium molybdate, 40-45%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo	80¢
Molybdenum oxide briquets, 48-52% Mo, f.o.b. Langeloth, Pa., per pound contained Mo	80¢
Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per pound contained Mo	80¢
Ferrotitanium, 40-45%, 0.10%C max., f.o.b. Niagara Falls, N. Y., ton lots, per pound contained Ti	$1.23
Less ton lots	$1.25
Ferrotitanium, 20-25%, 0.10%C max., ton lots, per pound contained Ti	$1.35
Less ton lots	$1.40
High carbon ferrotitanium, 15-20%, 6-8% C, contract basis, f.o.b. Niagara Falls, freight allowed, carloads	$142.50
Ferrophosphorus, 18%, electric or blast furnaces, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equalled with Rockdale, Tenn., per gross ton	$58.50
Ferrophosphorus, Electrolytic, 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton	$75.00
Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.	
Carload lots	14¢
Zirconium, 12-15%, contract basis, lump, f.o.b. plant, freight allowed, per pound of alloy	
Carload, bulk	4.60¢
Alsifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Niagara Falls, carload	6.25¢
Ton lots	6.75¢
Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound	
Car lots	8.50¢
Ton lots	9.25¢
Less ton lots	9.75¢

Boron Agents

Contract prices per pound of alloy, f.o.b. shipping point, freight allowed. Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

	Eastern	Central	Western
Less ton lots	$1.30	$1.3075	$1.329

Manganese—Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.

Ton lots	$1.89	$1.903	$1.935
Less ton lots	2.01	2.023	2.055

Nickel—Boron 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

Less ton lots	$2.10	$2.1125	$2.1445

Silcaz No. 3, contract basis, f.o.b. plant, freight allowed, per pound of alloy.	
Carload lots	25¢
Ton lots	26¢
Silvaz No. 3, contract basis, f.o.b. plant, freight allowed, per pound of alloy.	
Carload lots	58¢
Ton lots	59¢
Grainal, f.o.b. Bridgeville, Pa., freight allowed, 50 lb and over.	
No. 1	87.5¢
No. 6	60¢
No. 79	45¢
Bortram, f.o.b. Niagara Falls	
Ton lots, per pound	45¢
Less ton lots, per pound	50¢

Soviet Metalworking Books Now Available For U. S. Translation

New York

• • • **Earl Browder,** in his capacity of Soviet publisher's representative, has just announced the availability of 14 of the most important books on Soviet metallurgy and metalworking. Ten of them have already been published in Russian and the remaining four are due at the end of this year.

Mr. Browder, from his office at 55 West 42nd St., says that while the literature has not yet been translated, it is possible under certain circumstances to secure synopses or reviews in English. His Moscow office states that these synopses will be made by Russian experts in the various fields if American interest justifies the expense and effort attached.

This means that if any American publisher is interested in bringing out the books in English translation here the synopses can be made available at a rate of $2 per 100 words. It is said that by this process prospective publishers can obtain material sufficient for judging the value of the works.

The list of titles published by Metallurgizdat is as follows:

MINING:

Prof. N. I. Trushkov. Working Iron Ore Deposits. Part I, Underground Workings. 1946, pp. 570. (To be published at the end of the year.)

COKE AND CHEMICALS:

L. D. Gluzman & I. I. Edelman. Control of Coke and Chemical Production. 1946. pp. 454. Third enlarged edition.

IRON PRODUCTION:

Academician M. A. Pavlov. Iron Production. Book II. The Blast Furnace. 1946. pp. 492.

Academician M. A. Pavlov. Reminiscences of a Metallurgist. 1944, pp. 288.

STEEL PRODUCTION:

Prof. A. M. Samarin. Electrometallurgy—Steel Production. 1943, pp. 516.

S. D. Rostovtsev. The Theory of Metallurgical Processes. 1945. pp. 307.

MILLING:

Prof. A. I. Tselikov. Rolling Mills. 1946. pp. 560. (To be published at the end of the year.)

Prof. S. I. Bubkin. Theory of Pressure Treatment of Metals. 1946, pp. 480. (To be published at end of the year.)

METALLOGRAPHY AND THERMAL TREATMENT:

Prof. N. A. Minkevich. Low Alloy Fast-Cutting Steels. 1943, pp. 345.

Prof. A. A. Bochvar, (Corresponding Member of the Academy). Metallurgy 1946. pp. 404. (To be published at the end of the year.)

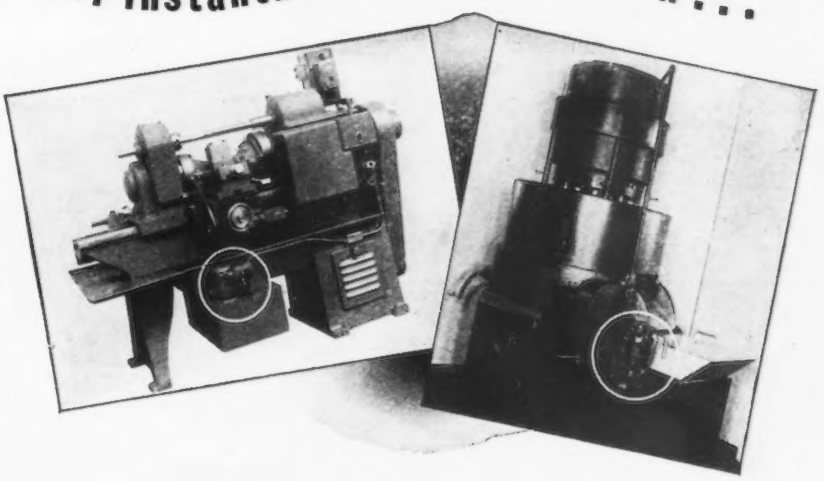
Academician G. V. Kurdiumov, (of the Ukrainian Academy of Sciences). The Reheating Brittleness of Structural Steels. 1945, pp. 135.

Prof. V. G. Livshitz. The Physical Properties of Alloys and Methods of Testing for Them. 1946, pp. 320.

Prof. V. G. Lirshitz. High Coercive Alloys. 1944, pp. 122.

Dr. A. M. Dymov. The Technical Analysis of Ores and Metals. 1944, pp. 316.

for instantaneous coolant flow . . .



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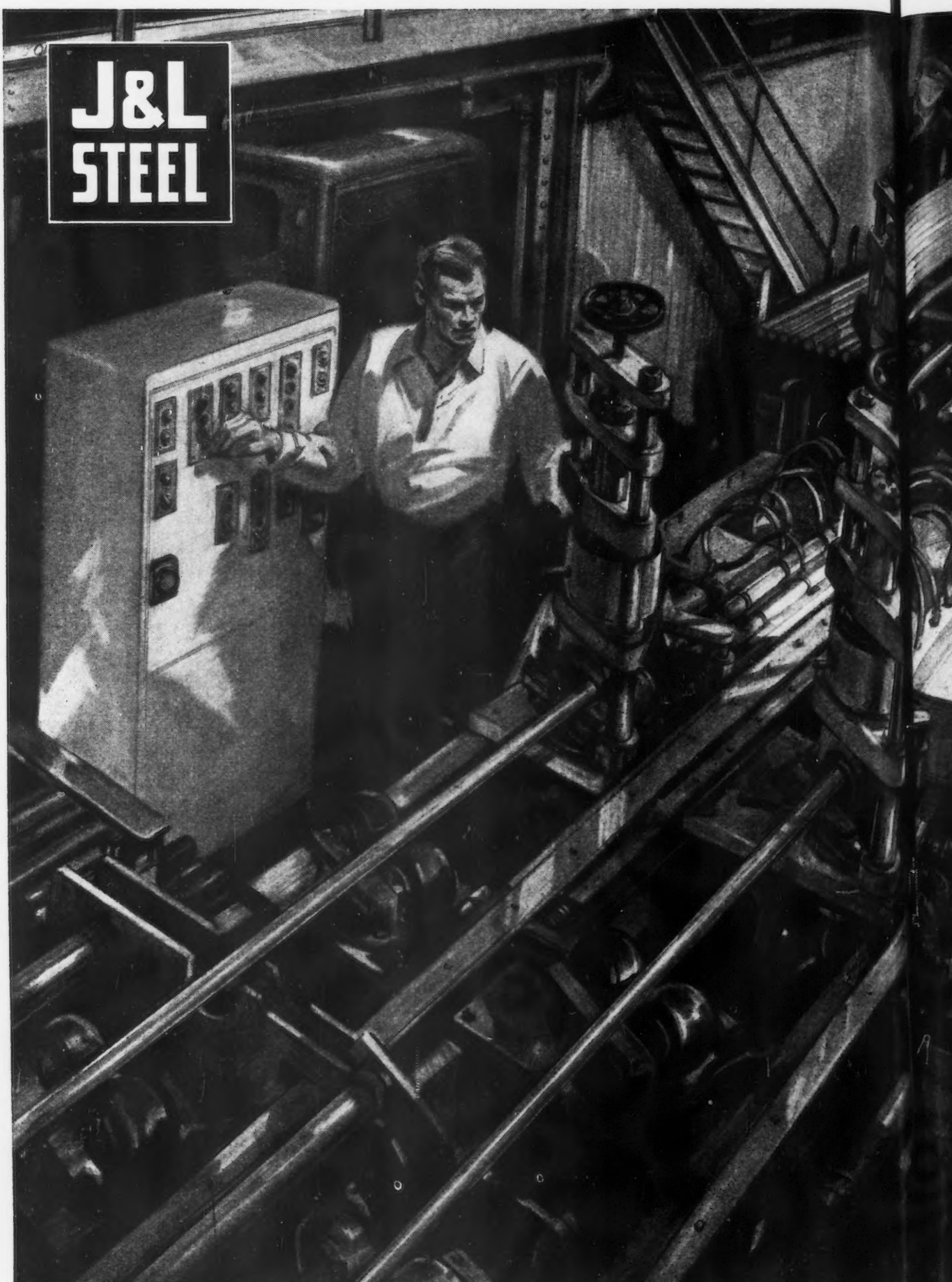

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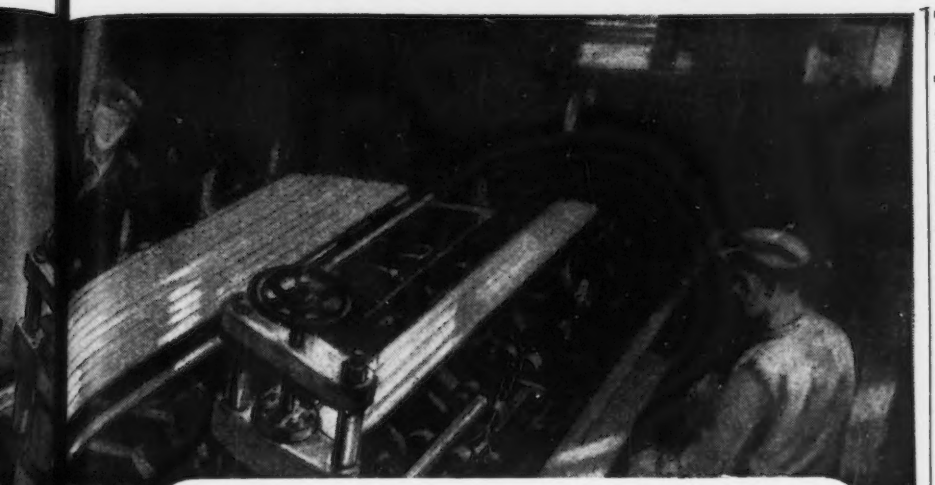


NOW, ELECTRONICS GOES TO WORK FOR J&L TO HEAT TREAT COLD FINISHED STEEL UNIFORMLY

Electronics, a fast, powerful, new industrial servant, has been put to work by Jones & Laughlin Steel Corporation in the electric induction heat treatment of cold finished steel bars for the first time by any steel producer. These new "Electreat" steel bars have a degree of uniformity not achieved by conventional furnace heating and tank quenching methods.

In the J&L "Electreat" process each bar is heated and quenched individually in exactly the same length of time as other bars in the lot. This is accomplished through the unusually accurate control of heating and quenching provided by the induction method. Yet "Electreat" bars retain their sectional accuracy and quality surface. Induction heating also keeps to a minimum decarburization which may cause uneven wear in a finished part. "Electreat" bars in a variety of sizes are available in a wide range of quenched and tempered treatments.

Application of induction heating to provide uniform cold finished bars with better physical properties accents J&L's leadership in cold finishing steel, invented by J&L and patented in 1859.

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH

"ELECTREAT" STEEL

Smart design and production engineers step up their production and cut out costly heat treating operations by using quenched and tempered cold finished steel for parts of autos, domestic appliances, business machines and many other applications. By using bars heat treated for them in the steel mills they gain advantages of increased strength, ductility, hardness, toughness without necessity of heat treating the finished part in their own plants. This also removes possibility of distorting the article after intricate machining work has been completed. They now will find that J&L "Electreat" bars give them additional advantage of increased uniformity over conventional heat treated bars.

Cold finishing, patented by J&L in 1859, improves size accuracy, surface, and physical characteristics of hot rolled steel bars. All the advantages of cold finished steel are retained in J&L "Electreat" process.

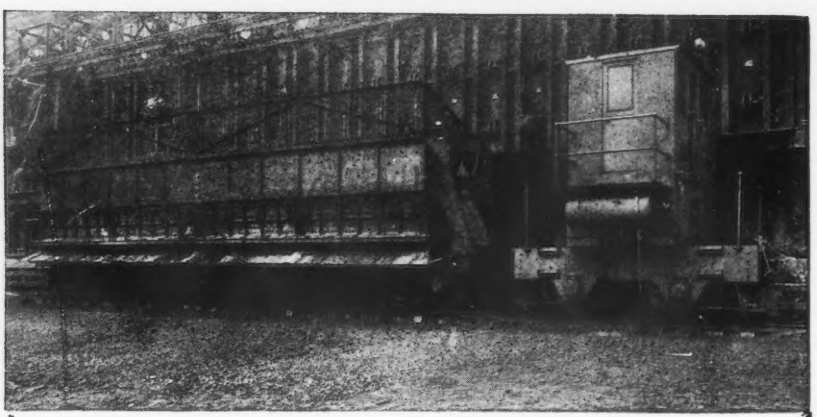
Electronic principle of transformer is used in "Electreat" induction heating method. High frequency electric current flowing through a coil transfers to the bar passed through it. The resistance of the bar to the current causes heating to take place with extreme rapidity. In "Electreat" process the bars are fed continuously through an induction coil. Depending upon their size and desired temperature, they are heated in 15 to 25 seconds to about 1600 degrees F. The coil itself, which does not come in contact with the bar, remains cool. In fact, you could place your hand inside and not feel heat, yet if you had on a metal ring it would be melted instantly. When the bars leave the coil they pass through a cone of water sprays which strike the steel at high pressure. This produces a rapid rate of cooling to harden the steel. In cases where this more severe quench will fully harden the section it may be possible to substitute plain carbon steel for a low alloy steel.

Steel can be quenched in many mediums, including air, water, brine, molten salts and various light and heavy oils.

Heat treatment is ancient art, was practiced by mystics and alchemists of the Middle Ages in fashioning armor and swords. Centuries later the village smithy still depended upon his sense of color for his crude but no longer mystic heat treatment. He heated steel in forge to dull red, cherry, or orange, plunged it into oil or water and determined by filing or scratching if steel was quenched to proper hardness.

Father of modern heat treating was Henri le Chatelier (1850-1936) who discovered many new facts about the effect of heating and cooling steel. He started the advancement of heat treating from a hit-and-miss art to an exact science.

COKE OVEN EQUIPMENT



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Says German Technical Methods Will Improve American Production

Washington

• • • **The technological** and industrial organization that permitted the German war machine to maintain high output, despite difficulties in communications and transportation and a shortage of skilled manpower, offers invaluable clues for improving American mass production methods, according to Dr. Todos M. Odarenko, of the Office of Technical Services, Dept. of Commerce.

Dr. Odarenko recently returned from Germany, where he headed the overseas Electronics and Communications Unit of OTS' Technical Industrial Intelligence Div He was on leave of absence from the technical staff of the International Telephone & Telegraph Co., New York.

Declaring that the utilization of German production techniques has already saved American industry an inestimable amount of time and money in independent research and experimentation, Dr. Odarenko urged businessmen and manufacturers to take full advantage of the unparalleled opportunities for studying German scientific and industrial developments.

"Industry should send more investigators to Germany at once," Dr. Odarenko said, "since the possible signing of a peace treaty and the return to more normal conditions in Germany may eventually bring an end to American investigations."

Though the fundamentals of many German developments are not unknown to American engineers, their successful, wide-scale application to production methods and processes is novel, Dr. Odarenko stated. Obtaining exhaustive knowledge of the "know-how" for similar wide-scale use in America obviously is of paramount importance, he said.

To speed production, the German electronics and communications industries reduced the amount of piecemeal assembly work by using forgings, castings, molds, and preassembled component units, according to Dr. Odarenko. For example, an ingenious machine was invented to cast radar and radio chassis complete

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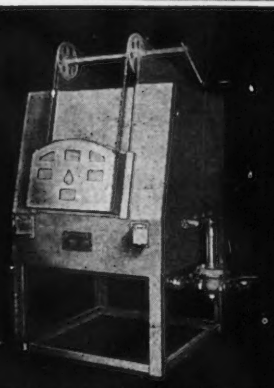
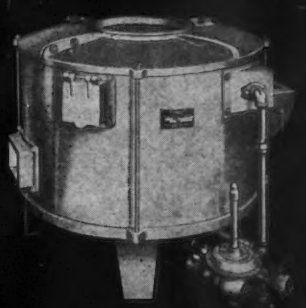
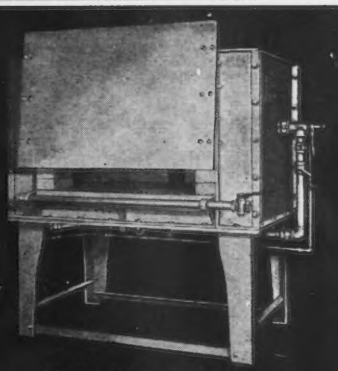


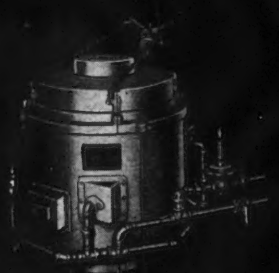
SEMI-MUFFLE OVEN FURNACE



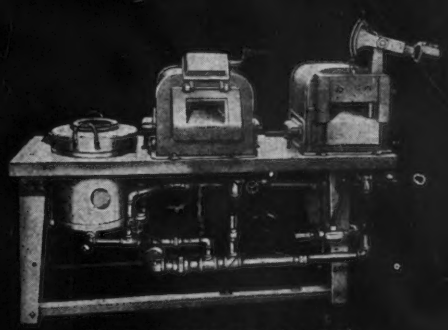
ROUND POT FURNACE



OPEN SLOT FORGE

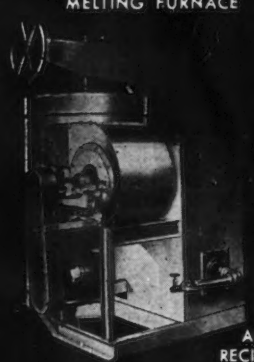


STATIONARY METAL MELTING FURNACE

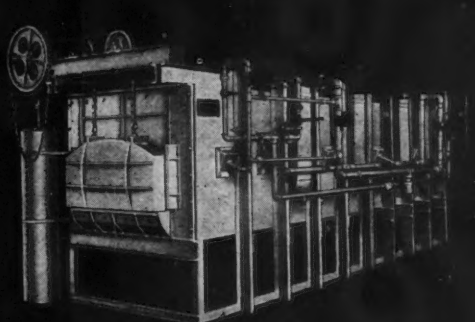


TRIPLE PURPOSE COMBINATION

SMALL FORGE



AIR DRAW RECIRCULATING FURNACE



HEAVY PORTABLE OVEN FURNACE

BENCH OVEN FURNACE

SUNBEAM STEWART INDUSTRIAL FURNACE DIVISION of SUNBEAM CORPORATION

(Formerly CHICAGO FLEXIBLE SHAFT CO.)

Main Office: 4433 Ogden Ave., Chicago 23, Ill.—*Canada Factory:* 321 Weston Rd., So., Toronto 9

A letter, wire or 'phone call will promptly bring you information and details on SUNBEAM STEWART furnaces, either units for which plans are now ready or units especially designed to meet your needs. Or, if you prefer, a SUNBEAM STEWART engineer will be glad to call and discuss your heat treating problems with you.

Handling conditions vary for each particular plant. Your own problem should be presented to an experienced material handling engineer. However, the following example outlines a simple method for determining the savings possible with an electric industrial truck. Let us assume a hypothetical plant with the simple problem of transporting daily 180 tons of material 200 feet from stockrooms to processing machines. Without power trucks this would require 10 truckers, each making 10 round trips per hour, or 80 trips per day, carrying 450 lbs. of material per load.

TABLE I—*Handling Costs Without Electric Truck*

Based on 180 tons per day	*Cost per day*	*Cost per ton*
Labor (85¢ per hour)	$68.00	$0.378
Social Security Taxes	2.72	0.015
Workmen's Compensation	1.00	0.006
Hand Truck Depreciation	0.30	0.002
Total	$72.02	$0.401

In order to mechanize handling operations, the following equipment would be required:

TABLE II—*Cost of Equipment for Mechanizing*

Fork Lift Truck 2000-lb. capacity	$4,100.00
Battery	600.00
Charging Equipment	840.00
200 pallets	700.00
Total	$6,240.00

The truck, handling one-ton pallet loads of material, making 24 round trips per hour, could transport the 180 tons in 7½ hours.

TABLE III—*Annual Expense—Truck Operation*

Depreciation—Truck at 10%	$410.00
Battery at 20%	120.00
Charging equipment at 6⅔%	56.00
Pallets at 20%	140.00
Tires	100.00
Repair and Maintenance—Truck	164.00
Battery	24.00
Charging Equipment	33.60
Replacement of damaged pallets	70.00
Electricity	82.00
Insurance	10.00
Total annual expense	$1,209.60
Expense per day	4.03

TABLE IV—*Handling Costs—With Electric Truck*

Based on 180 tons per day	*Cost per day*	*Cost per ton*
Labor (Driver—$1 per hour)	$8.00	$0.044
Social Security Taxes	0.32	0.002
Workmen's Compensation	0.16	0.001
Truck Expense	4.03	0.022
Total	$12.51	$0.069

TABLE V—*Savings With Electric Truck*

Savings Per Ton	$ 0.332
Savings Per Day (Handling 180 tons)	59.51
Savings Per Year (300 days)	17,853.00
Per Cent Reduction in handling costs	83%
Annual earnings on investment	286%

While this example is obviously oversimplified, Baker Material Handling Engineers are prepared to show you how similar savings can be made on handling operations in your plant.

COST OF MATERIAL HANDLING

Per ton—based on 180 tons per day

In addition to these savings, Baker Trucks reduce warehouse rental charges by tiering, contribute to plant safety, speed production and material movement, and perform many other operations that reduce plant overhead.

BAKER INDUSTRIAL TRUCK DIVISION *of The Baker-Raulang Company*
2172 WEST 25TH STREET • CLEVELAND, OHIO
In Canada: Railway and Power Engineering Corporation, Ltd.

Baker INDUSTRIAL TRUCKS

with the partitions and supports necessary for mounting electronic components.

"Previously, the chassis were stamped out of sheet metal, and the partitions and supports—angle arms and the like—for each of the many components used in a radio or radar set had to be bolted or screwed separately to the chassis," Dr. Odarenko explained. "The casting machine, by combining all these separate operations into one, conserves time and labor."

A similar German development for expediting the mounting of electronic assemblies was the wide use of ceramic insulating plates with printed or painted electrical connections. Such connections eliminated the need for the conventional, laborious wiring, Dr. Odarenko said.

The report states that thorough study of German technique is essential for the successful American manufacture of any useful material developed or invented in Germany in recent years. Careful reading of available documents describing the composition of the material and the machinery for its production, and even detailed physical examination of both material and machinery in many cases have yielded insufficient information.

For example, Dr. Odarenko said, American manufacturers ran into difficulty when they attempted to reproduce the German process for converting powdered polystyrene into a tough, plastic film called "styroflex." The film has excellent dielectric and mechanical properties. The Germans successfully used it as insulating material in high-frequency cable and as a substitute for mica sheets in high-precision, fixed capacitors. American manufacturers, however, found that the plastic film they produced lacked the uniformity of thickness and the stability and flexibility of the German-made product. A special team of experts had to be sent abroad to obtain additional information from the Norddevtsche Seekabelwerke, at Nordenhaus, the company that perfected the polystyrene conversion process.

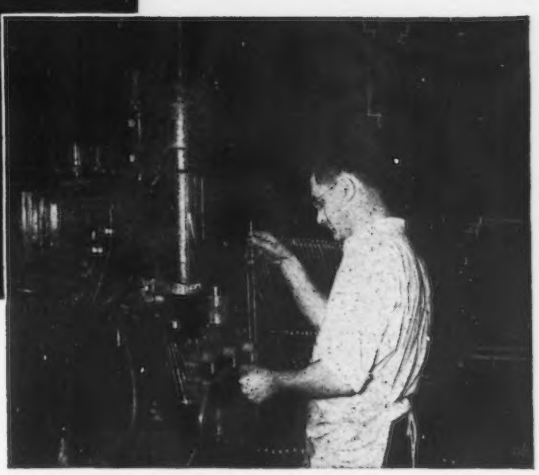
Manufacturers interested in sending investigators to Germany should communicate with John C. Green, Director, Office of Technical Services, Dept. of Commerce, Washington 25, D. C.

1 to 18 wire welds on the same welder!

Wire trays for refrigerators, ovens, kitchen cabinet shelves and many other uses are being produced *at the rate of 2,000 per hour* at the modern plant of the L. A. Young Spring and Wire Corp., Detroit.

A recent installation of 14 Sciaky 250 KVA projection welders helps maintain this impressive production record. An outstanding characteristic of these machines is *flexibility* . . . the same welder can accommodate many jobs with only a simple change in dies and settings.

If your problem involves joining wire in one or many operations, it will pay you to investigate this rugged, versatile welder. Ask for a SCIAKY application engineer.



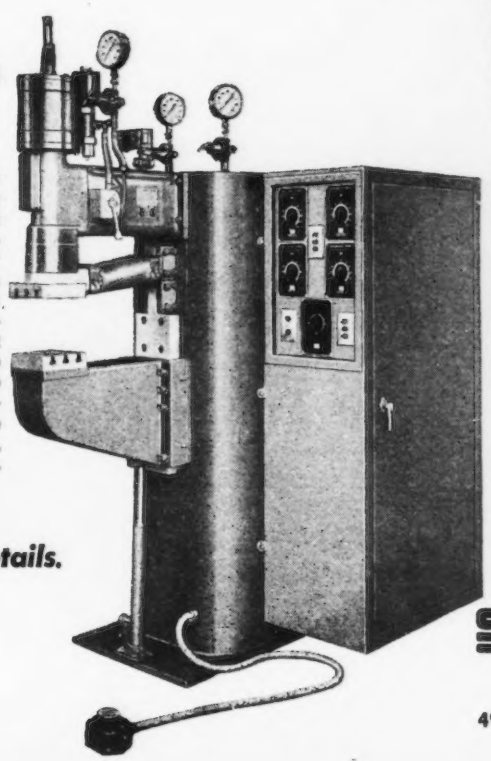
3 simultaneous spots weld .050" channel to .225" wire frame on these refrigerator trays.

9 cross wires of .092" stock are welded to an .307" trim section in one operation.

Handles are welded to refrigerator tray with two simultaneous spots. (Majority of material is 18-8 stainless steel.)

Specially Designed for use in the Wire Industry

This projection welder (type PMCO 1-250-18) is rated 250 KVA at 50% duty cycle. Capacity is from two 1/16" basic steel wires up to and including eighteen 11-gauge wires. Stepless heat adjustment is provided by *both* tap switch and phase shift. Complete electronic controls insure balanced circuit, cleaner, faster welds.



Write for Complete Details.

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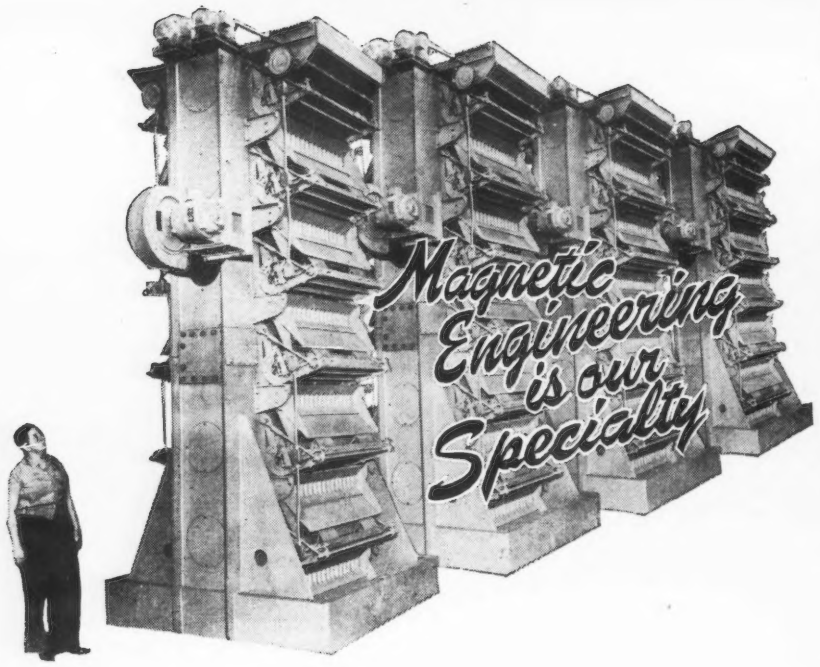

Whether it be these gigantic magnetic separators for difficult ore concentration problems or a diminutive 3" magnetic clutch for machinery control, Stearns Magnetic engineers are prepared to serve you with many years of practical and profitable application experience.

If you need protection for your product, machinery or employes against the hazards of tramp iron—concentration of ores and minerals or reclamation of metals, for improved values—purifications—moving material fast and economically with magnets — controlling machinery with clutches and brakes — Stearns Magnetic equipment will speed production, lower costs.

Consult us for reliable magnetic engineering and laboratory service.

Want one? We have a limited supply of these alnico pocket magnets for free distribution, letterhead requests only, until they are gone. Mention Iron Age.

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SEPARATORS
MAGNETS
PULLEYS
CLUTCHES
BRAKES

Barringer Discusses N. Y. Scrap Convention

Pittsburgh

• • • **Speaking before** the Pittsburgh chapter of the Institute of Scrap Iron and Steel, Inc., Edwin C. Barringer, national president, outlined the program that will be presented at the national convention in New York in January. In addition to a national public relations campaign that will be instituted by the scrap industry to show the importance of the part played by scrap in the nation's basic industry, internal functions of scrap yard operation will be discussed.

Ranking among the foremost topics at the New York meeting will be the question of better cost accounting systems for scrap yard operations, dealers and brokers. Much of the blame for stabilized scrap prices throughout the war, despite constantly increasing costs, were laid by observers to the fact that no true knowledge of costs were available to the individual operators. Safety, insurance, plant improvement, and brokers' and bundlers' problems will also be subjects of discussion.

The Pittsburgh Chapter elected new officers for the coming chapter season. They were: President, Leonard H. Krieger, Southwest Steel Corp.; vice-president, Herman Caplan, M. W. Singer Co.; secretary, Samuel M. Goldberg, Pennsylvania Iron and Steel Co.; and treasurer, Robert M. Jacobson, Luria Bros. & Co., Inc.

October Truck Sales May Surpass Record

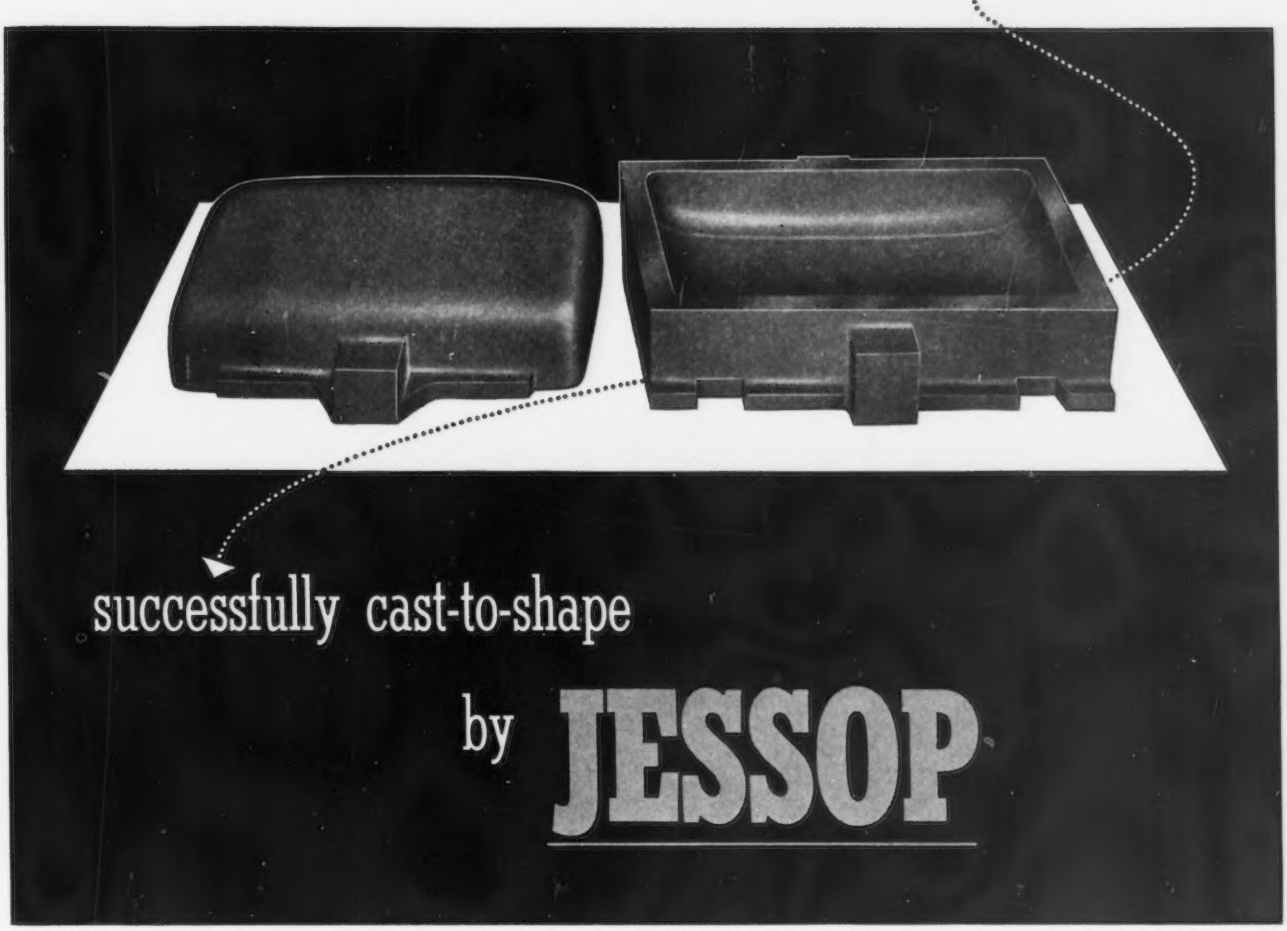
Detroit

• • • **October truck sales** as reflected by registrations may surpass the record-break September total of 69,565 units according to R. L. Polk & Co. statisticians. Total registration for 38 states for October was 50,178 units indicating a minimum of 65,000 units for the month.

The total new trucks registered during 1946 now stands at 467,288 as compared with 550,148 for the same time and states in 1941. Although close to prewar yearly totals, it is not expected that the new trucks sold during 1946 will surpass the 1941 total.

6 tons of tool steel

for molding plastics



successfully cast-to-shape

by JESSOP

The punch and die illustrated, cast-to-shape from JESSOP'S Dica flame-hardening tool steel, are used for molding plastic automobile tops. Each piece of the punch and die set weighs close to 6000 pounds. The proper technique for casting intricate tool steel dies of this size are part of the "know-how" of the Jessop Cast-to-Shape Division. Use of tool steel for this application results in maximum production and minimum "down time".

Jessop's Cast-to-Shape Tool Steels can be cast to close tolerances . . . permitting you to specify high production alloy steel wherever required, and at the same time hold machining costs and material costs to a minimum. Whether the part weighs tons or pounds it will pay you to investigate the economies of JESSOP Cast-to-Shape Tool Steel.

Write for literature.

JESSOP STEEL COMPANY

Washington, Pennsylvania

Tailor-made Specialty Steels

For COMPLETE Hoist "KNOW-HOW"

● Your job of selecting a hoist for materials handling in your plant is important.

It's important because the hoist you select should "pay its way" through efficient, low cost operation. And before any hoist can pay for itself, it has to be the right one for the job.

To simplify your job of selecting the right hoist, we have prepared a new Reading Chain Hoist Catalog. 40 years of successful hoist engineering lie behind its 32 pages of information on hoist applications, construction details and installation methods. This complete hoist "know-how" is yours with the new Reading Chain Hoist Catalog No. 60. Write today for your copy and full details on the Reading Hoist Line.

READING CHAIN & BLOCK CORPORATION
2101 ADAMS ST., READING, PA.
CHAIN HOISTS ● ELECTRIC HOISTS
OVERHEAD TRAVELING CRANES

READING HOISTS

Weekly Gallup Polls

(CONTINUED FROM PAGE 105)

The vote:

	Pct
Should	24
Should not	37
No opinion	39

The vote against breaking off relations may be due to the fact that there is no general agreement in this country as to whether Franco Spain is a threat to world peace.

Attitudes on that question were polled as follows:

"Do you think the Franco government of Spain is a threat to world peace?"

The vote:

	Pct
Yes, it is	34
No, it is not	29
No opinion	37

Russia has been the power most active in the campaign to unseat Franco. From the earliest days of the United Nations Organization the Russian delegates have demanded drastic UN action against the Spanish leader.

But the average American does not think that the Spanish people are any worse off, so far as freedom is concerned, than the Russian people are under the dictatorship of Stalin and the Communist Party.

In fact, the average American is inclined to feel that a citizen of Spain is actually better off than a citizen of Russia.

This is shown in the following survey:

"Do you think that a citizen of Spain has more freedom or less freedom than a citizen of Russia?"

The vote:

	Pct
More	31
Less	13
Same	17
No opinion	39

Attitudes toward Spain show some difference according to political party. Democrats are slightly more inclined than Republicans to favor stern treatment of Franco.

On the question about breaking off diplomatic and trade relations, Republican voters polled divided 22 pct in favor, 40 pct opposed, and 38 pct without opinions.

Democrats voted 27 pct in favor, 36 pct opposed and 37 pct no opinion.

MISSOURI
Mother of the West

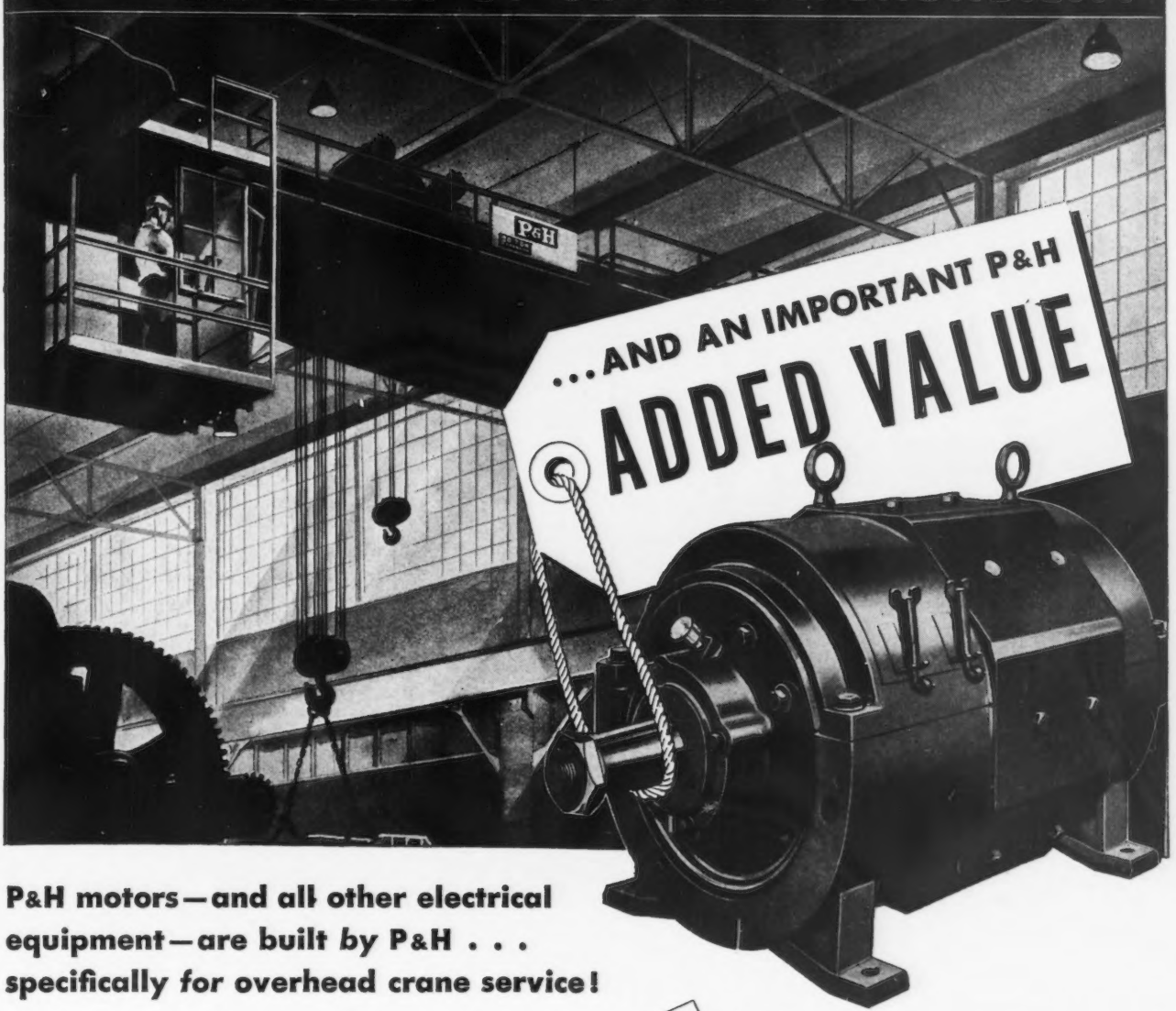
The relationship of the State of Missouri to the great Western reaches of America is truly that of guardian and benefactor. Missouri is the center of the Nation—a vital link between the East and West. What better industrial or commercial location could be desired?

Besides ideal location, Missouri counts among her advantages: A modern (1945) State Constitution designed to encourage industry; a vast network of transportation facilities; low taxes; abundant water supply; plentiful labor, skilled and semi-skilled; wealth of natural resources; diversified markets; low cost power; 350 alert communities eager to cooperate; and offers as evidence of these outstanding attributes the fact that 2,663 new businesses were incorporated during the first 11 months of 1946.

Specialized, confidential service to industrialists. Write direct: Missouri State Division of Resources and Development, Dept. 0-62, Jefferson City, Missouri.

THE STATE OF MISSOURI
In The Heart of America

P&H ELECTRICAL EQUIPMENT . . . HEART OF CRANE DEPENDABILITY



P&H motors—and all other electrical equipment—are built *by* P&H . . . specifically *for* overhead crane service!

The reason why P&H motors are so outstanding is because they incorporate over 60 years of crane motor building.

These rugged P&H motors are specifically designed and built (not adapted) to fully withstand the severities of crane service—to longer endure the rapid accelerations, frequent reversals and numerous shock loads and with far less maintenance.

Following are but a few of the added values in P&H's type "CR" direct current motors:

Extra-large diameter shafts with the duplicate ball bearing equipment at both ends.

Welded rolled steel, split-type frames for ease of maintenance.

Spider mounting makes removal of armature winding easy.

Liberal commutator design with full interpole construction, provides perfect commutation under all load conditions.

FREE ENTERPRISE MEANS:
Better products - for more people - at lower cost

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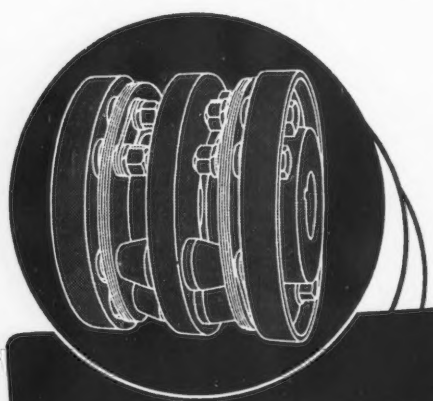
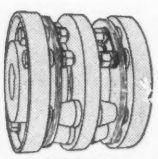
ELECTRIC OVERHEAD CRANES
4401 W. National Ave.
Milwaukee 14, Wisconsin
HARNISCHFEGER CORPORATION
ELECTRIC CRANES • EXCAVATORS • ARC WELDERS P&H HOISTS • WELDING ELECTRODES • MOTORS

THOMAS
Flexible COUPLINGS

are specified by engineers wherever 100% dependability is demanded

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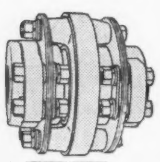
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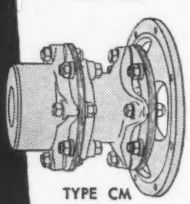
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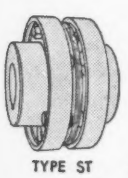
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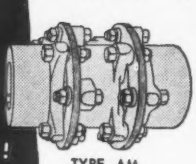
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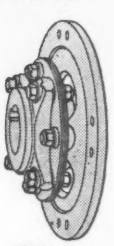
THOMAS *Flexible* COUPLINGS provide for Angular and Parallel Misalignment as well as Free End Float . . . *and Eliminate* BACKLASH, FRICTION, WEAR and CROSS-PULL

NO LUBRICATION IS REQUIRED!

The Thomas All-Metal Coupling does not depend on springs, gears, rubber or grids to drive. All power is transmitted by direct pull.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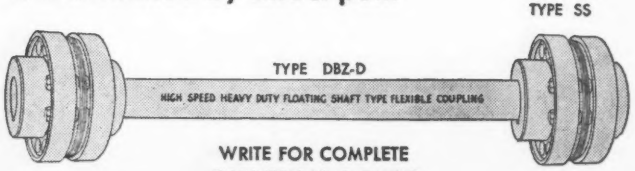

TYPE DBZ-D

HIGH SPEED HEAVY DUTY FLOATING SHAFT TYPE FLEXIBLE COUPLING

WRITE FOR COMPLETE ENGINEERING CATALOG

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA

U. S. Bureau of Mines Discloses Details Of Unique Coal Planer

Washington

• • • **Construction details** and operating features of a unique German coal planer, considered one of the outstanding wartime developments in the mechanical-mining equipment field, are contained in a new Bureau of Mines publication now available for free distribution to the mining industry and the public, Dr. R. R. Sayers, Director of the Bureau has announced.

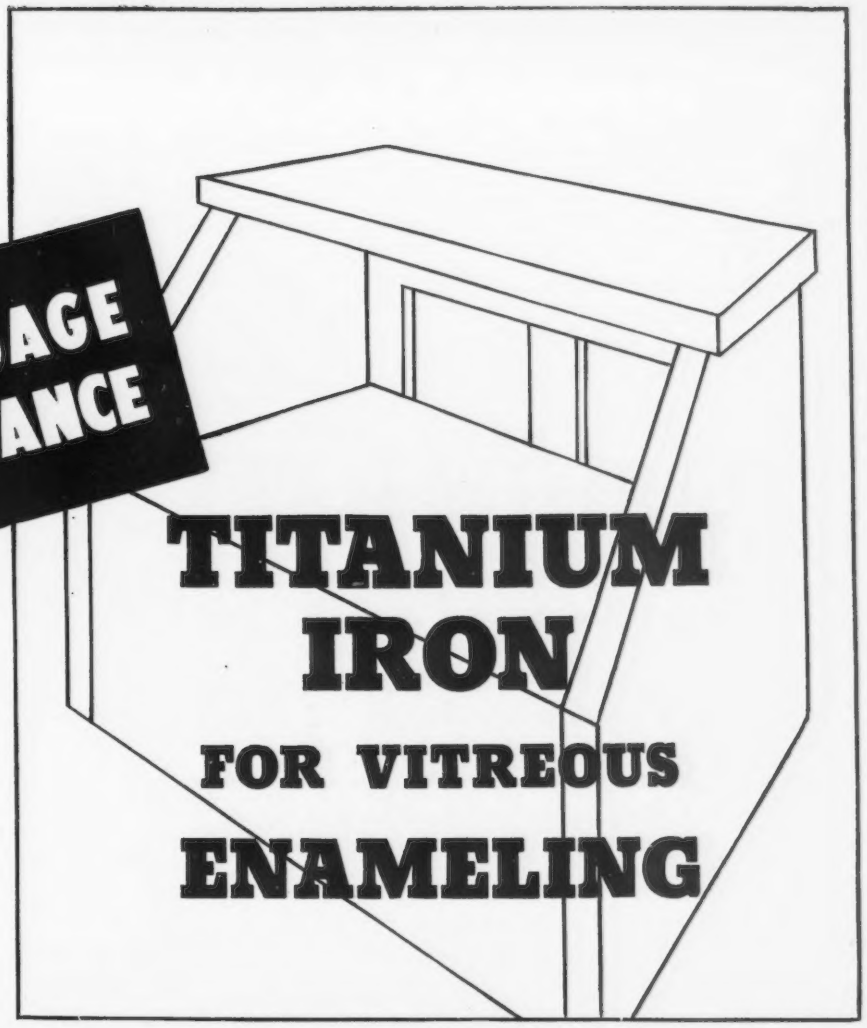
The action of the coal planer, as its name implies, is much the same as that of the carpenter's ordinary wood plane, but is designed to operate productively in either direction, shearing a continuous 12-in. undercut of coal from the lower third of the longwall face. In passing, the equipment loads the coal so planed as well as any loose coal that lies in its path. As the plane is pulled along the longwall face by 10-ton-test wire ropes mounted on electric or compressed-air hoists, the upper two-thirds of the seam either caves or is barred down and is loaded on the return trip, Mr. Buch reported.

The planing equipment thus eliminates the time-consuming drilling and blasting work and by simultaneously accomplishing all of the separate tasks of breaking down, loading, and conveying, maintains a high continuous production rate with a minimum number of working places, the Bureau report revealed.

In German mines using the planer, longwall faces ranged from 260 ft to 820 ft in length and in some operations the action of the planer was so rapid and efficient that miners experienced difficulty in completing auxiliary work such as timbering and backfilling. The longwall method in the Ruhr district is used largely for mining beds that pitch less than 30 deg although before the end of the war a variation of the standard coal planer was employed in some steeply-pitching beds.

A free copy of the publication, Information Circular 7377, "Design and Operation of the Coal Planer, Ruhr District, Germany," may be obtained by writing to the Bureau of Mines, Dept. of the Interior, Washington 25, D. C.

THINNER GAGE SAG RESISTANCE



TITANIUM IRON FOR VITREOUS ENAMELING

ENAMELED WARE of lighter gage stock can be fabricated to desired shapes and retain a better appearance because of the increased sag resistance of Titanium iron for vitreous enameling. This particular feature is clearly demonstrated on chart at right.

Another feature is the elimination of formerly necessary ground coats. For—under proper shop conditions—the cover coat can be applied directly to the base metal. Also, these thin finishes reduce the hazards of chipping and breaking. Furthermore, at enameling heats, there is no sign of enamel boiling. During three years of both research and production experience, no case of fish scaling has been reported.

Further information is available upon request.

EFFECT OF GAGE AND COMPOSITION ON SAGGING RESISTANCE

GAGE AND COMPOSITION	DEGREE OF SAG IN %
24 Ga. Standard Enameling Iron	100
24 Ga. Titanium Steel	57
18 Ga. Standard Enameling Iron	100
18 Ga. Titanium Steel	18

The Titanium Alloy Manufacturing Company produces the titanium alloy used in the manufacture of this steel. For samples of this steel, see your steel supplier. Pending patent applications on the new enameling process and products made thereby are owned jointly by Inland Steel Company, and The Titanium Alloy Manufacturing Company under trust agreement.

TAM

TITANIUM ALLOY MANUFACTURING COMPANY

Executive Offices: 111 Broadway, New York City *General Offices and Works:* Niagara Falls, N. Y.

Typical of Hendrick's

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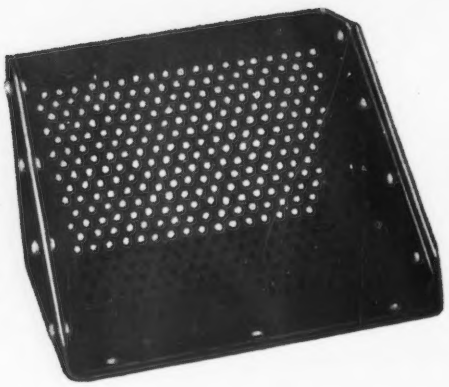

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London Economist

(CONTINUED FROM PAGE 111)

to work still leaves an uneasy fear lest Lewis, who is skilled in turning coercion to his own ends, may yet find a way of exploiting his surrender. (It might be worth noting that the myth of the mine leader's unbeatable shrewdness is as widely believed as was the not dissimilar myth about Hitler.) If the government can coerce Lewis into calling his miners back to work, it ought to be able to coerce the owners into paying them at least what he asked for them last spring.

The second level of debate, being free from the weight of each day's discomforts, is richer in ideas. Most of these have to do with changing laws, though Clinton Golden of the CIO upper circles recently emerged from a labor-management conference to say that he was "astonished at the number of management men who have come around to feeling that the cure for these labor-management problems is not legislation. I think there are more than even the unions realize. Suggestions come from many quarters to be considered by the new Republican Congress which will convene in January.

Proposals from members of Congress, from industry, from more or less innocent bystanders, attack both the theory of control and the machinery of control. Both are at present based on the Clayton Act which, hailed as Labor's Magna Carta in 1914, states that human labor is not a commodity or an article of commerce; on the Norris-La Guardia Act of 1932 which forbids courts to issue injunctions in labor disputes; on the Wagner Act which sets up methods of handling disputes and an agency (now moribund) to administer those methods.

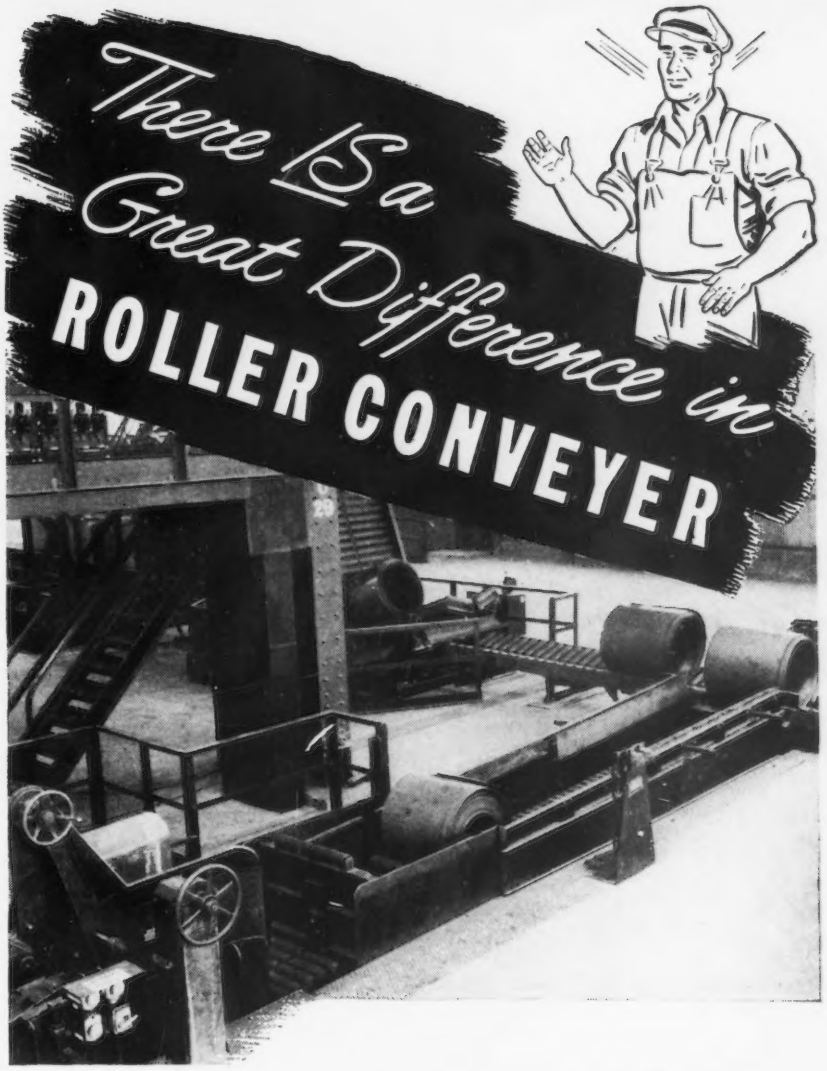
Perhaps the most revolutionary proposal is that unions should be made subject to some such control as that applied to industry under the anti-trust laws. This emanates from the National Assn. of Manufacturers. The editors of *Fortune*, devoting an entire issue to "Labor in U. S. Industry," present a modified form of that idea

as the most drastic of four principles of reform. They distrust union bigness, say "certainly the utmost encouragement should be given to big unions to decentralize, to place primary responsibility on their locals, and to avoid that pyramiding of power that is as noxious in union organization as in the holding companies of the twenties." The comment is specially pertinent in view of the recent Supreme Court decision sustaining the death sentence on such holding companies.

The Manufacturers also suggest changed procedures, including a major revision of the Wagner Act to remove its bias in favor of labor; they would correct certain specific abuses, would outlaw the closed shop, ban industrywide picketing, prohibit coercion of individual workers through mass picketing.

Another basic change is suggested by certain members of Congress who would make arbitration compulsory in disputes in which work stoppages can jeopardize the national economy and safety—a description which sounds reasonable until one reflects on the close interdependence which characterizes the entire American world. Senators Fulbright and Ferguson would set up labor courts to handle compulsory arbitration matters; Congressman Herter prefers an executive body.

All these suggestions attack the problem at the legal end, some with shotguns and some with water pistols. Discussion on the third level begins with the realization that the law on the subject is at best an imperfect crystallization of the public will, and can always be upset by hardy men who are not convinced of the unanimity and holding power of that will. If a democracy is to hold its sovereignty intact and flexible, it must have other and earlier disciplines to which its citizens bow. The last resort, becoming also the first resort, is too often tried, worn thin, in peril of breaking at a crisis. The awareness of this danger is inspiring a shift in American thinking about the education that should lie behind the law, a shift which may in turn affect its thinking about organized labor.



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